INDIGENOUS KNOWLEDGE, LIVELIHOOD AND DECISION-MAKING STRATEGIES OF FLOODPLAIN FARMERS IN BANGLADESH

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DECLARATION

I confirm that this thesis is based on original work and no part of the material has previously been submitted by me for a degree qualification in any other University or academic institution. In all cases material from the work of others has been acknowledged and quotations and paraphrases suitability indicated.

Gour Pada Ghosh

(Gour Pada Ghosh)

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ABSTRACT

This thesis discusses indigenous knowledge, livelihood strategies and decision-making processes of floodplain farmers of Bangladesh. It focuses on Ujankhalsi village. The floodplain is the major geo-ecological feature of Bangladesh, occupying about 79 per cent of the total land area. Here terrestrial and aquatic environments interplay with considerable seasonal variations and people obtain their livelihoods by exploiting these resources.

Anthropological research methods have been employed to gain access to information relating to people's livelihood strategies. It was found that different groups use the floodplain in different ways in order to obtain their livelihoods. There exists a multi-resource use pattern of which farming is the major, though not the sole occupation; fishing and other activities supplement it.

Various interventions have been made to increase floodplain rice production without taking into consideration the local socio-ecological realities. As a result, other resource users, notably fishers, have been adversely affected by these 'improvements'. Many problems have emerged relating to farming and fishing activities. Financial aid schemes intended for poor farmers rarely reach the most needy and can even increase debt. In some cases conflicts occur over access to common resources.

This thesis discusses how Ujankhalsi farmers gain knowledge about their environment from their personal experiences. This knowledge is socio-culturally embedded and must not be overlooked from any development scheme. Farmers apply their knowledge in making their agricultural decisions. However, due to various constraints, farmers cannot always go with their preferred choice, and have to turn to alternatives. The floodplain is a risk prone area and farmers need flexible options to make suitable cropping decisions, but they are now limited as crop diversity has decreased significantly due to the domination of HYV paddy and increase in other agriculture risks, such as water congestion in the *beel*, decreasing soil fertility, etc. This thesis emphasises that development practitioners should consider local people's knowledge, which is ecologically sound, socio-culturally adapted, and dynamic in nature and has the ability to contribute significantly to agricultural development.

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1. INTRODUCTION

1.1 INTRODUCTION

Anthropologists, nowadays, have increasingly engaged with the dynamism and complexity of rural communities. They are also exploring the relationship between productive technologies, environmental, socio-economic and political factors which influence rural development. This thesis is an ethnographic study of indigenous knowledge and its role in agricultural development. Such knowledge is deeply rooted in the local farming system, which is socio-culturally embedded and complex in nature. However, the inclusion of this knowledge into the agricultural sector may appear to be primitive, economically undeveloped, outmoded and also inappropriate to modern development practitioners and is also contrary to widely adopted high production and sustainable development. This thesis argues about the suitability of this form of modernisation, which excluded the local reality and the sector, as a whole, increasingly dependent on scientifically constructed, high technologically specialised productive system. The application of western capital-intensive model to third world countries, such as Bangladesh, where agriculture is mainly subsistence in nature and also labour intensive, less cost-intensive, is questionable.

My contention is that by introducing such schemes which neglect the local knowledge this sector fail to achieve its sustainability. This thesis will examine how the situation has become complicated by incoming agricultural 'experts' to improve its productivity.

The specific concern of this thesis is to explore how the people of floodplain Bangladesh use their indigenous knowledge to maintain their livelihood within the prevailing constraints and opportunities. It will, also, analyse how they arrive at their decisions on 'what to grow where and when'. Different models / theories, established earlier on this field, will be explored and compared with the Bangladesh context, using the floodplain village of Ujankhalsi as a test case.

1.2 GENERAL BACKGROUND

This section discusses the past and present scenario of population and economy of Bangladesh, its geo-ecological regions with special references to floodplain and its production system so as to provide the background of the study.

1.2.1 Population and Economy

For centuries Bengalis have called their homeland 'Bangladesh', the land of the *Bangali*. The Bengal region is bounded by the Bay of Bengal to the South and the Tibetan massif to the North, a comparatively narrow bridge between the subcontinents of India and Southeast Asia (Rashid, 1991) (Figure 1.1). Its land area is 143,998 sq. km (of which nearly 6.5% comprises rivers) - a flat floodplain laid down by the three major rivers of the region, the Ganges-Padma, the Brahmaputra-Jamuna and the Meghna. Today it remains predominantly rural with 91 per cent of the population living in the rural areas. The recent population is 129.2 million, with a high, 2.17 per cent, annual growth rate. The population is expected to reach 226 million by 2030 (Herbon, 1994; Ahmad and Hasanuzzaman, 1998; The Daily Janakantha, 24-August, 2001) (Table 1.1), which would make Bangladesh the eight largest country in the

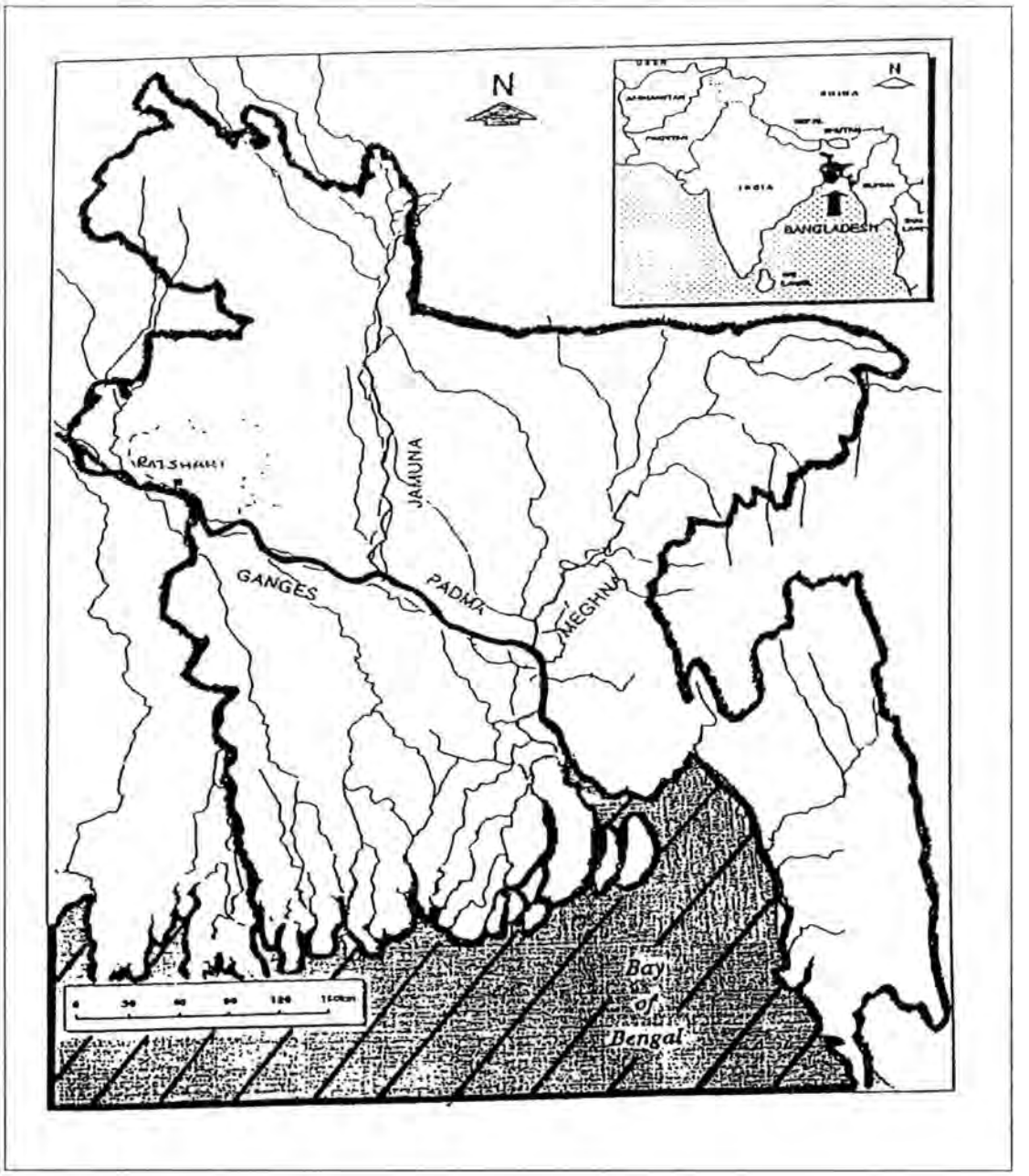


Figure 1.1 Map of Bangladesh

world, in terms of population size and, except for some islands in the Nile delta and Java, the one with the highest density (834 people per sq. km. according to the preliminary report on population census, 2001). The 1996 agriculture census shows that 33.82 per cent of rural households have no arable land; 18.83 per cent have less than 0.5 acre; 13.67 per cent have between 0.5 to 0.99 acre; 20.36 per cent have 1.0 to 2.49 acres; 11.56 per cent have 2.5 to 7.49 acres and only 1.67 per cent have more than 7.49 acres of land (Government of Bangladesh, 1998a). So more than 50 per cent of people either have no land or just the land on which their homestead is situated.

Table 1.1 Population growth 1911 - 2001 plus projection of 2030.

Year	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001	2030
Population (in million)	31.6	33.3	35.6	42.0	41.5	50.8	75.1	89.9	111.4	129.2	226*

Source: modified after Herbon, (1994: 310)
** Data adjusted (Task force report, 1991 and Govt. of Bangladesh, 1998a)
*The daily Janakantha, 24-Aug.-2001, Dhaka

The Bangladesh economy is predominantly agrarian, which provides employment for a large segment of the growing population. In fact at least 80 per cent of Bangladeshi people earn their livelihood from agriculture and agricultural related activities. Rice is the principal crop, which contributes 56 per cent of the GDP (Gross Domestic Product). However, it is very likely that production will eventually prove incapable of feeding the population. During 1960 - 1984, the economy grew on average by about 4.5 per cent per annum (Chowdhury, 1998) and in the last five years 1994-1999 it has been about 6 per cent. There are, also, worries as to whether this rate of growth can be maintained, or whether it has levelled off as the gains from intensification of dry season agriculture with HYV crops tail off. Some observers are confident that the upward trend is continuing (Palmer-Jones, 1999), while others are less certain (Adnan, 1999; Crow, 1999; Rogaly *et al.*, 1999). However, the level of per capita annual

income remains very low, at about US $261 in 1996 (Government of Bangladesh report, 1998b). Although there is still cheap food, strengthening domestic demand (World Bank, 1998), there remains a lack of an adequate, planned, industrial base. This, coupled with high a population growth rate, means that the development of the country is slow and so most of the growing labour force are being engaged in the agricultural sector. Thus this sector is gradually becoming economically less profitable.

1.2.2 Agriculture

The past history related to agriculture was not like as it is now. In the past when agriculture was mainly traditional, Bengal was a prosperous country. Bengali folk songs, proverbs and poems praise the virtue of the peasants' self-sufficiency. The following quotes will be of help for understanding the peasant life of Bengal in earlier times: Six centuries and a half ago (probably in 1345; Rashid, 1991: 138) the Moroccan explorer Ibn Battuta reported:

> "... this is a country of great extent, and one in which rice is extremely abundant. Indeed, I have seen no region of the earth where provisions are so plentiful" (Yule,1866: 457).

The French traveller Bernier, who visited Bengal around 1660, recorded:

> " ... Egypt has been represented in every age as the finest and most fruitful country in the world, and even our modern writers deny that there is any other land so peculiarly favoured by nature; but the knowledge I have acquired of *Bengale*, during two visits paid to the kingdom, inclines me to believe that the pre-eminence ascribed to Egypt is rather due to *Bengale*. ... The three or four sorts of vegetables which, together with rice and butter, form the chief food of the common people, ... and for a single *roupie* twenty or more good fowls may be bought. Geese and ducks are proportionately cheap ... Fish of every species, whether fresh or salt, is of the profusion. In a word, *Bengale* abounds with every necessary of life" (Bernier, 1914: 437-9; Boyce, 1987: 3-4).

Bernier also described Bengal's handloom textiles, which then ranked among the world's greatest industries' (Boyce, 1987). In 1790, Lord Cornwallis, the Governor-

General of Bengal, appointed by the British East India Company, also paid tribute to the land's fertility:

> "We have, by a train of the most fortunate events, obtained the dominion of one of the most fertile countries on the face of the globe, with a population of mild and industrious inhabitants, perhaps equal to, if not exceeding in number, that of all the other British possessions put together" (Friminger, 1917: 542).

Now there remains the question why it is so precarious now? The high population growth, no doubt, plays a crucial role. However, inappropriate, faulty planning has failed to keep up the economic growth of the country. The tendency of development practitioners to get high production by over exploiting natural resources, has failed to address the sustainability of this sector.

The risk factor in agriculture has always been high in Bengal. The success of the agriculture system depends on its flexible adaptation to the unpredictable and harsh ecological conditions of the monsoon climate with its variable rainfall and flooding. In the past, the farmers had enough opportunity to make flexible choices to cope with the situation. Although the crop yields were lower than those obtained today from the present high yielding varieties, peasants were more solvent than in the present day, due to their traditional adjustment. The development practitioners failed to recognise this basic feature of agriculture. Therefore, it is important to know what knowledge farmers have in relation to agricultural resources management, how they apply it in maintaining their livelihood and how the experts' knowledge has created problems for local farmers in securing their livelihood.

1.2.3 The Floodplains of Bangladesh

Bangladesh can be divided into several geo-ecological zones, which comprise Tertiary hills, Pleistocene terraces, floodplain, deltaic plain, rivers, forest, etc. However, almost

two-thirds of the country consists of floodplain. So floodplain represents the dominant geo-ecological feature of Bangladesh. A large area of estuarine or marine alluvial plain are found in the Meghna Estuarine Floodplain (2464 sq. km) in the south east and the extensive Ganges Tidal Floodplain (17,006 sq. km) in the south, where soil salinity is a problem due to regular saline water intrusion. The most extensive riverine floodplains are those of the Ganges Floodplain (24, 508 sq. km) in the west; the Brahmaputra Floodplain (16, 344 sq. km) in the central part of the country; the Tista Floodplain (10, 304 sq. km) in the north west and the Surma-Kusiyara Floodplain (9,195 sq. km) in the north east (Barr *et. al*, 1996; FAP 17, 1994). The river alluvium varies in composition with the different rivers and their distances from their origin. Moreover, topographic factors and the pattern of river flooding that influence the depth and duration of inundation by floodwater and spatial variation of soil quality are important factors, which influence local land-use pattern.

Although mainly level, the riverine floodplains have a gently undulating relief consisting of broad ridges or *levees* representing current or former riverbanks, separated by more extensive basins or *backswamps*. Within these floodplains, the depressional areas commonly contain perennial water bodies, known as *beel,* which may become connected to the rivers and other *beel* during the period of water inundation. Differences in elevation between ridges tops and the basin centres are not usually great, varying between 2 and 5 meters with the distances varying from 0.5 to 2 km depending on the region (Brammer, 1994). UNDP / FAO (1988) identified six inundation land types which are widely accepted by researchers and development practitioners. Homesteads are situated on the higher, flood free land and the farmland occupies the area from the higher land to near plain land extending down to the *beel*

centres (Figure 1.2). The concern of this thesis is to deal with the agricultural system of *beel* areas in the riverine floodplain. This floodplain is prone to flood while the extent of flooding can vary from year to year, depending on the spatial and temporal distribution of rainfall and coincidence of river peaks. At the same time, alluvial deposits, brought by the floodwater, replenish the fertility of the topsoil, thus enhancing crop production during the flood free periods.

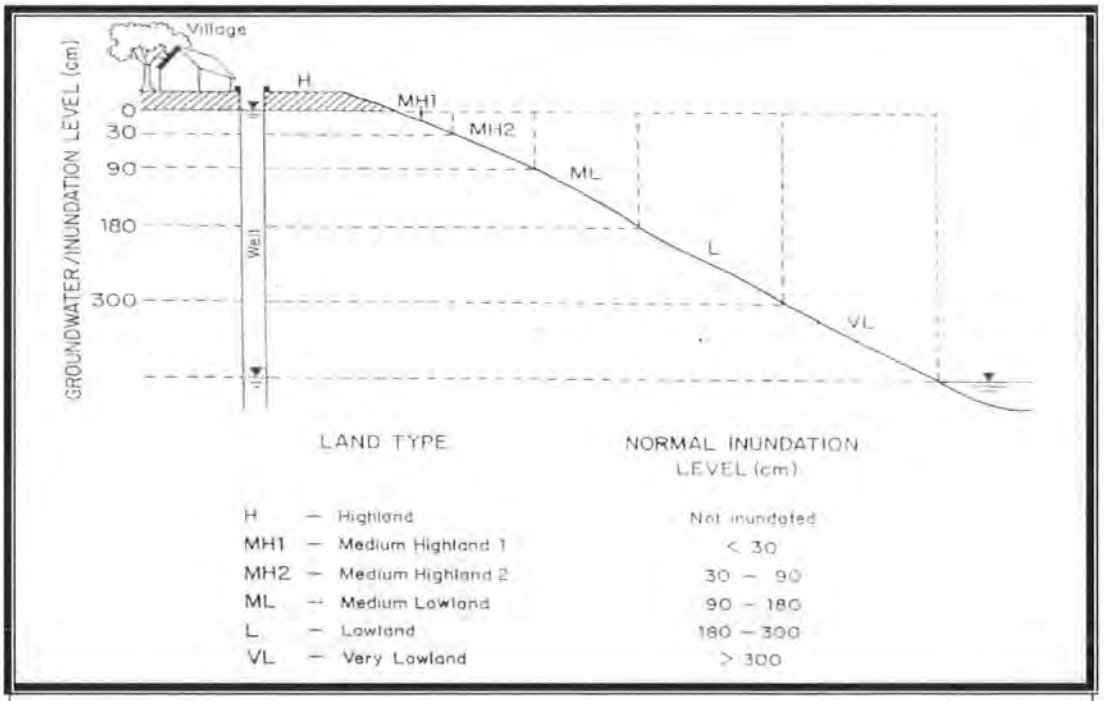


Figure 1.2a Schematic relationship between groundwater level and inundation level by land type (UNDP/FAO, 1988; after Barr *et al.*, 1996)

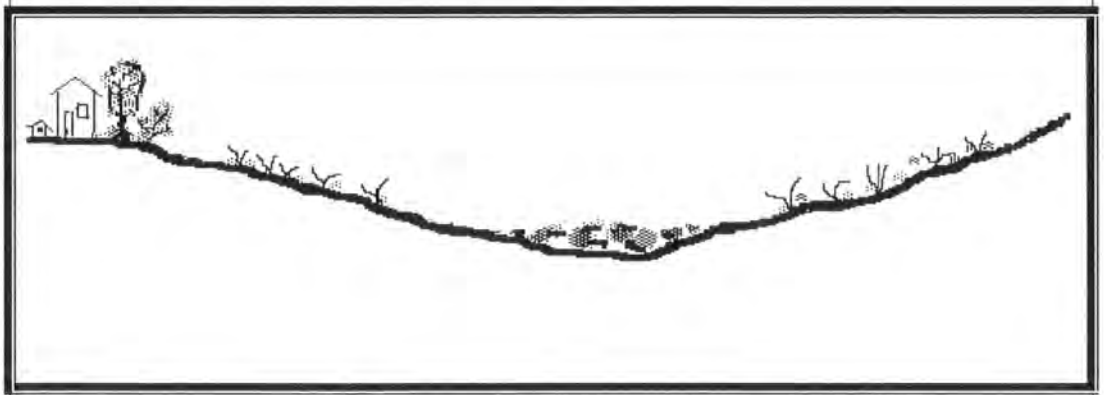


Figure 1.2b Schematic representation of a cross section of *beel* and its adjacent area

1.2.3.1 Floodplain Production System

During the flooding period all lands of the *beel*[1] go under water so are not suitable for growing all crops, as few crops can tolerate the high flood level and those fairly tolerant are grown on restricted plots. At this time, this water body becomes a 'common property'[2], as normally all people have equal access there and fishing becomes an important part of their livelihood. During the dry season, when the floodwater shrinks, land become available for cultivation and such land becomes private property. At this time only owners (or sharecroppers, lease owners) have access. So there exists interplay of 'land and water' and 'private and common' property in floodplain and this dynamic nature of floodplain influences people's livelihoods (Figure 1.3).

1.2.3.1.1 Floodplain resources use pattern

The *beel* and its adjacent villages represent a typical agrarian economic structure found in Bangladesh. It is mainly a system of subsistence farming. The traditional agricultural system was developed indigenously in this ecosystem and, later, it has been substantially modified by the adoption of modern technologies imported from outside. Farming or fishing is the main occupation of people in floodplain areas but very few households depend solely on either activity, most of them integrate these two in order to make their living. The study of FAP 17 (1994) shows that in agricultural communities only 34.0 to 45.1 per cent of households gave farming as their principal source of income, whereas 1.4 to 10.4 per cent cited fishing. Similarly, in fishing communities only 25.7 to 45.8 per cent of households gave fishing as the principal source of income, while 11.8 to 27.1 per cent obtained most of their income from farming.

[1] Natural floodplain depression, containing permanent or semi-permanent water body.
[2] In *beel* areas, where, lands remain under private properties but if water on those lands retains above the knee height (approximate 2 feet), the water becomes a 'common property' and any one can fish there. However, if this water retains less than knee height, it becomes a 'private property' and fishing is restricted on those lands.

Beel in the early monsoon season

Beel in the monsoon season with jute crop

Fishing within a *beel* in the monsoon

Collecting snails from the *beel* for ducks in the monsoon

Preparing *beel* land for dry season crop

Transplanting paddy seedlings in *beel* area during the dry season

Figure 1.3 *Beel* areas in different seasons of the year.

Different groups of people here have differential access to resources for making their living. Therefore, their livelihood strategies differ. For example, full-time fishermen are strictly not full-time fishermen in true sense, as part of their livelihood comes from other non-fishing activities such as agriculture, wage labourer, seasonal petty business, etc. There are several part-time fishermen who fish during the monsoon when there is a lack of agricultural work and fishing is a complementary strategy to the agricultural activities. Opportunistic fishing activities, contribute substantially to the families' food security. Poorer families neither own nor have easy access to land resources for agriculture. They either depend on part of their livelihood from fishing, sharecropping wage labouring or combine both to maintain their livelihood. Unable to be self-sufficient in food production, the livelihood of small farm families depends increasingly on a mixture of sharecropping, agricultural and non-agricultural wage labouring, petty business, etc. The poor and small- farm families are also dependent on aquatic vegetation for their food, building materials, etc. Therefore, their livelihoods rely on both aquatic and terrestrial resources. Wealthier farmers are comparatively less involved in open water fisheries; however, they also depend on a variety of strategies, both agricultural and non-agricultural activities such as employment, business, etc. to maintain themselves. Thus, it can be seen that there is a clear pattern of multi-resource use among floodplain communities.

Therefore, to establish any strategy i.e. to make any decisions concerning their livelihood, they need to take into consideration the whole perspective of their environment. As agriculture is the main occupation of most of the dwellers, its decision-making processes also are dependent on the whole production system. It is argued that there is a need for a holistic approach to understand the agricultural

decision-making process or, in other words, the livelihood strategies of floodplain dwellers.

As resource use patterns in this area are adapted to the temporal and spatial dynamic interface between terrestrial and aquatic natural resources, the rural people are vulnerable to seasonality and natural shocks (Chambers, *et. al*, 1981; Gill, 1991; Dixon, 2000). The ecology of floodplain is so fragile that little variation in the climatic regime can result in major damage to their production system. For example, untimely rain or late receding of floodwater can delay sowing or transplanting crops which, consequently, could be damaged by drought or early, flood in the subsequent months and vice versa. It is, therefore, necessary to examine how households from different categories build their livelihood strategies to reduce their vulnerability.

1.2.3.1.2. Interventions on the floodplain and its impact on rural livelihood

Several interventions have occurred over time in order to obtain high agricultural production. During the 1960s, the government took steps to bring about what was to be known as the Green Revolution. This involved introducing high yielding varieties (HYVs) of rice and employing new technology. Although the initial introduction and performance of the HYVs was promising, in the end it failed to meet the expectations (Lipton and Longhurst, 1989; Shiva, 1991). In the 1980s, the Bangladesh government introduced further measures in an attempt to rectify the situation. They sought to intensify dry season agriculture by developing small-scale irrigation schemes and to bring about floodplain modification by initiating flood control techniques[3]. Even these measures failed to bring about the desired results (Hossain, 1991; Saha, 1991;

[3] This is known as the Flood Control and Drainage (FCD) Project. The aim of this project is to assist farmers by protecting them and their crops from floodwater. Under this project, flood vulnerable areas have been brought flood protection by constructing embankments along side the river and flood prone areas with sluice-gates where necessary to regulate water in and out in the protected areas.

Chowdhury, 1998, Faruqee, 1998; Rahman, 1998). Critics of the Green Revolution and Post-Green Revolution policies have argued that the new technologies largely benefited the wealthier farmers, whereas, the poor farmers and fishermen gained little and, also, that the measures taken may be ecologically unsustainable in the long term (Haggart, 1994; Hughes *et al,* 1994; Rahman *et al*, 1994; Wood, 1994; Faruqee and Chowdhury, 1998). However, the introduction of dry season irrigated agriculture has helped the country to achieve food self-sufficiency at the present time through a huge investment in irrigation equipment, such as, Shallow Tube Well (STW) and Deep Tube Well (DTW).

After implementing the FCD Project, there have been marked changes in the floodplain ecosystem. Under this project, the embankments were equipped with sluicegates or regulators, to manage the flow of water in and out of protected areas. These, actually, restricted the entrance and movement of fish inside the protected areas. As a result the *beel* fisheries were reduced to an almost non-economic level. It is estimated that 81 per cent of households are dependent on floodplain fisheries (DOE, 1990) and that floodplain fishery has been reduced by about 70 per cent in recent years (NEMAP, 1995). So a large segment of population are affected by these measures. Due to these interventions, most farmers have adopted HYV technologies to improve the productivity of their crops. Now HYV rice is found to be an increasingly important feature in floodplain agriculture. There is also a major shift in the cropping pattern, which has been extended from rain-fed to the dry season agriculture when traditionally different oil seeds, pulses and vegetables were grown. As a result, overall cropping patterns have become less diverse. On the other hand, the HYV crops require more 'bought inputs' such as fertilisers, insecticides, irrigation water, etc. and farmers, especially, small and poorer families find it difficult to obtain sufficient level of inputs

for their crops in order to get the desired production. These intervention schemes, also, radically affected fishermen as well as small and poor farmers who are dependent on the natural resources for their livelihood. Moreover, the short-stemmed HYV paddy is particularly prone to damage from abnormal flooding and the non availability of inputs, such as fertilisers, at critical growing period can lead to dramatic falls in yield (Palmer-Jones, 1999). So if there remains such possibility then why these interventions and it is, of course, the sustainability of this self-sufficiency is now in question. Therefore, this thesis will examine how floodplain farmers of Bangladesh perceive their environment, what knowledge they possess about their resources management; how they are capable of accommodating themselves in the dynamic nature of the locality in order to obtain their livelihoods and it will argue why it is essential to incorporate 'local knowledge' into development programmes.

1.3 THE AIMS AND OBJECTIVES OF THE STUDY

The overall aim of this study is to further the understanding of the floodplain farmers' indigenous knowledge (IK) and their decision-making process in order that, in future, they be taken into consideration when policies are formed and implemented in an attempt to rectify the agricultural crisis situation now faced by Bangladesh. To satisfy this aim, it is necessary:

(1) to understand the livelihood strategies of floodplain farmers;

(2) to identify the major problems faced by farmers in *beel* areas of Bangladesh;

(3) to understand the role of indigenous knowledge to agricultural decision-making process;

(4) to examine how indigenous knowledge can contribute in addressing agricultural development.

It is essential for the authorities, when seeking to alleviate the precarious situation in the Bangladeshi agricultural sector, to take advantage of any available information regarding the constraints remaining at the grassroots level of this sector. Therefore, this study would be the basic providers about how people make their decisions regarding their farming activities. This information should be of immense value to both government and non-government agencies when they seek to obtain more efficient methods for sustainable rural development.

1.4 THEORETICAL FRAME OF THE STUDY

This section discusses the relevant research works related to indigenous knowledge and its role on agricultural decision-making process. Several theories will be discussed regarding how this knowledge should be distributed among rural people, its nature and how farmers apply this knowledge when making farming decisions.

1.4.1 Indigenous Knowledge and Its Importance in Agricultural development

Attitudes towards the relevance of indigenous knowledge (IK) are changing, as is apparent from the number of researches and development models that include farmers as active participants in the development interface (Chambers *et. al*, 1989; Thompson and Scoones, 1994; Warren *et al.*, 1995; Sillitoe, 2000a). The research on indigenous knowledge is relatively new in agricultural research and development and has emerged after the failure of 'transfer of technology' (TOT) or 'top down' programme (Richards 1986; Gupta 1991; Pretty and Chambers 1994; Thrup *et. al*, 1994; Biot *et. al,* 1995). It provides an opportunity to make a connection between the local people's understanding and practices and the work done by researchers and development practitioners in the field of natural resources management (Brokensha *et.al.*, 1980;

Rhoades, 1984; Richards, 1985; Warren and Cashman, 1988; Wamalwa, 1989). The scientific development practices have been subject to criticism for their universalism and their neglect of local adaptations that have fostered long-term survival of the farming population, despite their limited resources.

Scientists have a tendency to narrow down the meaning of indigenous knowledge (IK) in technical terms such as 'indigenous technical knowledge'. Sillitoe (1998a) criticises scientists for seeking to obtain information relating to their specialism as an independent technical fact, which ignores the socio-cultural context of the subjects. He warns about the danger of this practice. Actually this view has gained acceptance due to the experience of social groups in certain localities and their cultural context (Alteri, 1987; Richards, 1985; Sillitoe, 1998b). The dissimilarity between scientific knowledge and indigenous knowledge is that scientific knowledge is object oriented, universal in nature and instrumental, whereas local knowledge is characterised by embeddedness, locally specific, less instrumental and impossible to separate from subject and object (Banuri and Marglin, 1993). So researching into indigenous knowledge is important for understanding the farmers, their socio-cultural and ecological environments. In an attempt to clarify the situation, Sillitoe states that indigenous knowledge:

> "...may relate to any knowledge held collectively by a population, informing interpretation of the world, particularly in development currently that pertaining to natural resources management. It is conditioned by society, being culturally relative understanding learned from birth and informs how people interface with their environments. (1998c: 204)."

Several authors explain that indigenous knowledge is created, developed and adapted to specific environmental and socio-cultural conditions. In this sense, every item of indigenous knowledge is unique and has special qualities for sustainable development (Klee, 1980; Nagaard, 1984; Kean, 1988; Thrup, 1989; Warren *et. al.*, 1995). Titilola,

(1990) maintains that an important feature of indigenous knowledge is that it is dynamic, flexible and adaptable to the changing socio-economic, environmental and cultural conditions of any community. It is a product of complex interactions between many socio-cultural, environmental variables. It has the advantage of being economically affordable, involving a minimum of risk and socially desirable for the local farmers, which is necessary for sustainable development. It can be argued that why development practitioners do not share this unique experience, coping mechanisms, and decision-making capabilities of local people in development interface.

What is happening in the floodplain of Bangladesh? By ignoring the local people's understanding about their locality, policy makers have imposed their universal development models, which have little or no implication in the locality and, ultimately, failed to meet the desired goals for long-term basis. Most of the models emphasise the adoption and diffusion of innovations, which are scientifically constructed, have a single objective and leave no room for alternative ways. They fail to understand other worlds (Busch, 1978). On the other hand, in the real world there remain several factors, which cause constraints and reduce opportunities for different groups of people to have an alternative choice when making their decisions.

This thesis investigates how the actor in this society configure their decision-making processes and to what extent these are patterned. In general, the floodplain farmers may appear to be a homogenous group of people but in reality it is not. There remains internal differentiation on the basis of socio-economic standing and gender roles. Nazarea-Sandoval, (1995a) mentions this by citing the example of the Philippines

farmers where the social distribution of knowledge is uneven but patterned within different socio-economic groups and the gender of the individuals. If this is so, how they adopt the technological changes, new 'opportunities' and perceive the risks involved? It is discernible that the same set of criteria can be seen as opportunities by one group of people but as constraints by another group of people, or the same criteria at one time can be perceived as opportunities and at another time as constraints by the same group of people. Then how do they face this situation of constraints and opportunities when making decisions? Does it depend on personal perception regarding the situation or on patterns within socio-economic groups? Johnson (1981) comments that although there remain some complementarities and interdependencies among farmers, there are decision-making processes which are independent. Browder (1995) says it is personalistic, and derived from subjective empiricism. Therefore, there remains room for analysis, as if it is patterned within socio-economic groups and also personalistic in nature. How does this heterogeneity influence the actors' decision-making process?

1.4.2 The Decision-Making Process

This section deals with relevant researches on how farmers apply this indigenous knowledge in making their agricultural decisions. Most previous researches have been into how farmers ought to make decisions i.e. the decision-making events, rather than the actual process (Putler and Zilberman, 1988; Batte *et. al.*, 1990; Orasanu and Connolly, 1993; Kay and Edward, 1994). These authors emphasise the superiority of scientific views and neglect the practicality or reality of the process by which decisions are arrived at in the real world. Many researchers have had, in the past, a tendency to think that decision-making process of farmers consists of a series of steps or

dimensions which they, gradually, follow when making farming decisions (Bradford and Johnson, 1953; Johnson *et al.*, 1961; Castle *et al,* 1987). Ohlmer *et al.*, (1998) propose a model of decision-making process comprised of four phases and four sub-processes. The four phases are problem detection, problem identification, analysis and choice, and implementation. The sub-processes are searching and paying attention, planning, evaluating and choosing and checking the choice. It is like a project management by a development practitioner in his office, rather than the management of a farm in the open fields by a farmer. Rhoades and Bebbington (1995) illustrate this by stating, simply, that the tendency of rice scientists is to focus on 'how rice grows', whereas rice farmers are more interested in 'how to grow rice'. The former is theoretical and the latter is practical in nature. Earlier Levi-Strauss (1966) comments on this type of events as 'science of abstract' and 'science of concrete', respectively. Actually, there remains a wide gap between the thinking of development practitioners and that of local farmers.

Farmers construct their knowledge from their experience, either by participating or observing the events. They learn it in an unconscious way rather than being taught consciously in a classroom environment. In this way the knowledge becomes a part and parcel of local people's livelihood. The major reason for this gap is the sceptical attitude of researchers who suffer from their superior complexity and ignore local knowledge as inferior. Basically it is difficult to get a real impression of people's behavioural aspects without any long term field work / research in the locality. This is not codified that cannot be collected in a 'snap-shot' like way, through a short term PRA or questionnaire survey; it is a matter of in-depth understanding. If researchers fail to understand this reality, the gap will remain as wide as it is now.

There are also several indigenous decision-making models, which deal with how farmers make decisions in complex environments. Tversky (1972) proposes a model which he calls 'elimination by aspects'. He refers to the required characteristics of agriculture as 'aspects' and the first stage in the decision-making criterion is to seek to eliminate the aspects one by one. Gladwin (1980) elaborates this hypothesis and proposes a theory of 'real life choice', a two stages model. She believes that the decision-making process is a 'psychological' and 'realistic' phenomenon, which depends on prevailing opportunities and the constraints of a particular period. The first stage of this indigenous decision-making model consists of some alternative choices, when the farmers fail to implement their first one considering all other associated factors, then they go for the next one and so on. In the second stage, the final decision comes when each option is ordered on the basis of some important aspect and the final choice must then satisfy all the constraints of the situation and, thereby, a decision is made. Fujisaka *et al.*, (1996) propose a decision tree for crop planting in which he shows how Ethiopian farmers take decisions on what crops they use to grow on specific type of soils, depending on the availability of rains in the respective months. This thesis argues that the farming practices in a risk prone area cannot take in place such a linear, straightforward way. Therefore, I would question whether farmers, during the period of decision-making, always have enough options from which to make a suitable choice, which would overcome all constraints.

How should we address the decision-making process of farmers? Neisser (1967) discusses the nature of human beings with reference to unconscious processing of gathering information during their activities. Later, Gladwin and Murtaugh (1980) apply this theory in their pre-attentive and attentive decision-making hypothesis. The

pre-attentive decision-making criteria come from people's experiences of critical biophysical and socio-cultural factors such as soil, water, climate, subsistence requirements, etc. Whereas attentive decisions come out instantly, when constraints appear, and there is a need to change the pre-decided one. The attentive decisions also come from the cognitive configuration of farmers. Now a question may arise to what extent this pre-attentive and attentive decision- making is shared? It depends on the context and content of the events i.e. the situation under which the decisions are taking place. Sillitoe (2000a) says that farmers do not think about the bits and pieces of their decisions - it is the over all image that apparently comes to the mind.

This 'image' is important when actor acts in the real world. Rappaport (1979) discusses the relationships between nature and the human being and proposes two models concerning their interactions. He says:

> "... 'cognized model' is a description of a people's knowledge of their environment and of their beliefs concerning it. The second, the 'operational model', describes the same ecological system (including the people and their activities) in accordance with the assumptions and methods of the objective of sciences, in particular the science of ecology" (1979: 97).

Nazarea-Sandoval (1995b) elaborates on this hypothesis when she discusses the decision-making process of Kabaritan farmers. According to her:

> "cognized models are the magnifying lenses or, alternatively, the selective filters of our minds. They direct our attention to the 'relevant' field, however that might be defined, exclude other information as peripheral, and either emphasized or minimize our focus of attention....the operational reality, or what is out there, may be discovered, dissected, or distorted based on the lenses and filters that we, as individuals, as members of households, and as members of communities have been socialized to carry in our heads" (1995: x).

Therefore, the 'cognised model' defines the decision-making criteria and operational reality is the activities performed by actors in real biophysical and social environments. So it (operational reality) provides the context and events for the indigenous decision-

making process. However, she fails to establish how cognition determines agricultural behaviour. In cognitive perception, previous experiences coupled with the awareness of the present situation, in turn, evaluate and suggest the suitable action to take (Johnson, 1980). Therefore, it is important to know how farmers make decisions in the context of situational constraints or opportunities and what are the feedback effects, which in turn gives rise to more constraints or opportunities, in arriving at their further effective decisions. This research examines how this knowledge can be used in sustainable agricultural development. I agree, in part, with Sillitoe, Johnson or Nazarea's propositions and will seek to verify them in the context of my studied village. A case study has been made from a floodplain village of Ujankhalsi which can be taken as a prototype of other floodplain villages in Bangladesh.

2. METHODOLOGY

2.1 METHODOLOGICAL ISSUES

Research in the field of indigenous knowledge in agricultural development, natural resource management and decision-making is expanding rapidly. There is a growing awareness of what indigenous knowledge can contribute to the process of sustainable development. Little attention has been paid to date into discovering appropriate methodological techniques for investigating this knowledge for development purposes. Researchers in this field need to advance the research methodologies they employ, to access the knowledge rooted in social and religious belief systems, cultural norms and traditional practices (Lovelace, 1994 and de Klemm, 1985). The methodology used needs to take into consideration that indigenous knowledge is neither uniform, nor static and cannot be seen to be static, but is subject to continual negotiation between different stakeholders. The main concern of this chapter is to describe the type of methodology which has been used in this research and to take into consideration how one can overcome the limitations of suitable techniques aimed at capturing the real essence of indigenous knowledge. This thesis also argues why anthropological research techniques are more appropriate than those of other disciplines to carry out research on this issue (indigenous knowledge and rural development).

One major consequence of the 'transfer-of-technology' (TOT) approach has been that poor farmers have proved to be slow or unable to adopt many of the recommendations of agricultural research. In the 1970s, this non-adoption was often attributed to

ignorance and suitable education was prescribed. In the 1980s, the lack of response to suggested methods was attributed to technological problems rather than the type of farm or the farmer's attitude. Researchers sought to discover the reasons why farmers failed to adopt or understand methods suggested by scientists for improving production. Farming system research has also made a contribution to understand the complexity of farming. However, data extraction and statistical analysis have failed to identify the root problems of this sector. This is, possibly, due to the researchers failing to appreciate traditional farming methods and farmers themselves failing to appreciate the 'experts' point of view. This has given rise to a new method of dealing with understanding farmers and farming decisions termed as a 'complementary way' or as Rhoades and Booth (1982) describe it 'farmer back to farmer'. Chambers and Ghildyal (1985) define it as 'farmers first and last' and Farrington and Martin, (1987) as 'farmer's participatory research'. Chambers *et al.* (1989) in 'Farmers First' say:

> "Instead of starting with the knowledge, problems, analysis and priorities of scientists, it starts with the knowledge, problems, analysis of farmers and farm families. Instead of the research station as the main locus of action, it is now the farm. Instead of scientists as the central experimenter, it is now the farmer, whether woman or man, and other members of the farm family..." (1989: p xix).

This idea creates an image that most rural people are farmers and that their agricultural technology is central to solving rural problems including poverty as they hold the key to alleviating agricultural problems. This approach was criticised because it perceives farms as a 'closed system'. This was the populist approach where indigenous knowledge was given a narrower interpretation of local people's technical knowledge and its abilities in agricultural productive mechanism.

Recently, the perspective has changed and indigenous knowledge is seen as being socio-culturally developed, continuously negotiated among farmers and farming

communities and contested within a variety of ecological, social settings and local technical and non-technical knowledge etc. In this 'holistic approach', agriculture is seen as a complex, social process in which different stakeholder such as farmers, businessmen, extensionists, researchers, etc. will have a range of perspectives informed by their different aspirations, viewpoints and goals (Sillitoe, 1998a; Dixon *et al.*, 1998; Dixon, 2000). In a holistic approach, it is thought that the farming system is a sub-system of the household that contains it. There are, however, other activities, which have linkage with the livelihood strategies of farm families. In this approach, all sorts of activities of farm families have to be considered in order to understand the whole system. So there needs to be a suitable methodology which has the capability to capture this holism.

Researchers from different disciplines are using different methods to collect information on indigenous knowledge. Barker (1980) recommends a 'multi-method research strategy' as it affords a variety of different learning formats and experiences for both the outside researchers and the rural community. Compton (1989) suggests the following these methods when studying and verifying indigenous knowledge. She used 'agricultural calendars', 'simulations and games', 'joint agronomic activities', 'taxonomic techniques' and other participatory methods for conducting observation and analysis with farmers. In Northern Pakistan, Conway (1989) has used 'diagramming' by farmers for communication and analysis i.e. he uses different types of diagrams, e.g. 'maps', 'transects diagrams', 'seasonal calendar', 'flow diagrams', 'Venn diagrams', etc. to get access to information. Lightfoot *et. al.* (1989), in the Philippines, have used 'system diagrams' to facilitate researcher-farmer discussions, to identify farming practices and prioritisation of problems and to help developing on-

farm experiments. In Gujarat, water and soil conservation programmes have been developed using PRA (Participatory Rural Appraisal) techniques, such as 'informal discussions', 'participatory mapping' and 'group presentations' (Shah *et al.*, 1991). In Tamil Nadu, 'time lines', 'mapping' exercise and 'family profiles' have been employed to rehabilitate irrigation tanks and water channels (Devavaram *et. al.,* 1991). In Kenya, village resource management plans have been produced from spatial, temporal, social and technical data collected using various participatory techniques including 'mapping', 'time lines', 'seasonal diagrams', 'Venn diagrams' and 'transects' (NES, 1991). Mahiri (1998), in Kenya, has used 'transect walks' to compare the knowledge of experts and local people.

Numerous researchers are using different PRA (Participatory Rural Appraisal) methods to gather knowledge according to the problems faced. There is no rigid formula and practitioners are testing, adopting / rejecting, methods and adapting new methods to improve and strengthen PRA (Participatory Rural Appraisal). This approach provides a useful tool for collecting information from farmers but the outcome depends on the nature and length of their research. The researcher's rapport with local people, his attitude, situation-managing capabilities, translating capacity of knowledge, etc. is very important in this respect. He should keep close observation, maintain negotiation with individual and community and should have social analysis capacities. Barker and Cross (1992) found that rural people were reluctant to explain their methods of animal treatment, land conservation or herbal medicine for fear of being thought 'ignorant' or 'out of touch' with the modern world. However, after talking in positive terms and relating traditional techniques from other areas, informants began to share their own knowledge. Bicker and Lyon (1998) mention how misconceptions can occur when

there is a mismatch between local knowledge and scientific knowledge. The farmer's knowledge (in Bicker and Lyon's example) was based on 'social relations'. As a landlord he had considerable obligation to his family, tenant, sharecropper and his labourers as a result it is not possible to follow 'experts' opinion about his land use pattern. On the other hand the Extension Officer, who knew of PRA (Participatory Rural Appraisal) techniques, was seeing land use from his technical point of view. Therefore, he failed to understand why the farmers did not take his advice, even though it proved to be correct. Bicker and Lyon stress:

> " ...the application of an anthropological perspective can usefully enhance the appliance of agricultural science" so that if complete agreement cannot be reached at least 'closer understanding may well ....reveal conflicts of interest .... and to accommodate these as far as possible into a programme of sustainable soil improvement" (ibid: 5-6)

So developing a suitable methodology is a hard task. There is no straightforward way to incorporate any tested method which has been successfully used elsewhere, as it may not fit well with local reality (Pelto and Pelto, 1978; Ellen, 1984; Sillitoe, 1998b). Therefore, it requires research methodologies that will not compromise with anthropological expectation, will provide proper insight into the actual local situation, and also be cost-effective.

The Bangladesh floodplain is a complex, risk-prone area, where the farming system reflects the every day 'performance' of farmers. Natural hazards, such as a half an hour hailstorm, early or prolonged flood, or drought will upset the plans of poor farmers. People struggle to subsist there. In such socio-ecological contexts, indigenous farming decisions need to be explored and understood for development discourse. It is very difficult to get real information through a 'questionnaire survey', or staying for few weeks in the village using PRA methods, or trying to fit them into any fixed or pre-

conceived models. It is important to apply established methodological techniques appropriate to the situation.

I stayed in the village of Ujankhalsi for two periods: the first time for seven months (March, 1997 to September, 1997) and the second time for seventeen months (May 1998 to September, 1999). During these periods, I witnessed several cropping cycles (nine cycles -six full and three partial) when four natural hazards occurred: one hail storm in the Summer of 1997, one early flood during the early monsoon of 1997, one prolonged severe flood in the monsoon of 1998 and one short term drought in Summer 1999. Thus, I had opportunities for observing different events, which influence the farming decision of farmers in floodplain areas of Bangladesh. I used a number of techniques to access information.

2.2 FIELDWORK:

2.2.1 Site Selection

The UK government's Department for International Development (DFID) funded two programmes: Land Water Interface (LWI) and Socio-economic Methodology (SEM) for joint research in Bangladesh aiming 'to further sustainable development of the floodplain production system'. I worked as a Research Assistant on these projects, studying farmers' indigenous knowledge and livelihood patterns. There were two project sites, one on the Jamuna floodplain in Tangail District and the other on the Ganges floodplain in Rajshahi District. I worked at the Rajshahi site in the village of **Ujankhalshi** which is about 40 km away from Rajshahi city. The site was selected for me by the project, notably to meet natural scientists' demand.

The study area has:

(1) three *'beels'*(natural floodplain depressions containing permanent or semi-permanent water bodies) on three sides of the village. Two of which are perennial (Padma *beel* and Purba *beel*) and one (Choto *beel*) dries up during the dry season.

(2) Agricultural practices that cover the spectrum of the floodplain production system.

(3) People who follow diverse occupations within the floodplain.

(4) A typical Bengali community in a remote location, that has a rural livelihood pattern with access to a local market.

2.2.2 Making Contact in the Study Area:

I went to the field site for the first time on the 3rd of March, 1997. I found the project authority had set up a field house for our work. This was an abandoned Community Centre of the Social Services Department and situated at the middle of the village on the upper edge of the *beel*. The village market place was close to the field house and the village's single playground was also situated in front of the house (about 50 yards away). The position allowed me excellent opportunities for observing and meeting local people. Village meetings and functions are held on the playground. This helped me to take part in or observe meetings or functions.

At the field house I met Azahar, who was appointed as a caretaker there. He lives in the village and he has good contact with other villagers. He took me to the local High School and introduced me to the schoolteachers. Local people soon came to visit me, as they were very curious about the new residence and me. Some older people were under the impression that I was an agent of the 'British', as the project had British

academic collaborators. My appearance with British people in the village worried some older persons recalling there past colonial history. Others seemed to believe that the house was a '*Khoni* office'[4] (Mining Office) and that underground gas was to be collected from this area. They had lot of questions about our activities. After few months, it became clear to them that the researchers were not spying and were not doing them any harm, just there to do research and so they named our house as '*Bideshi* Office' (Office of the foreigners).

In Bengali culture, when addressing people, it is important to use the correct terms, e.g. the term *lok,* has different meaning in different contexts. Normally, it means 'man'(it can also refer to the several worlds of the universe). For examples, *trilok* means 'the earth' – the world of human beings, *lokguru* means teacher of the world (see Davis, 1983: 81-82). To villagers, *nizer lok* means their 'own' people, like 'relatives' or 'friends in need'. It is a very powerful term and difficult for visitors to be accepted as *nizer lok*. From the beginning of my fieldwork, I tried to earn people's trust, to be one of their *nizer lok*. For addressing people, I used to use some kin terms instead of name, like, *bhai* (brother) for young man, *bon* (sister) for girl, *chacha* (uncle), *chachi* (aunt) for men and women who are senior to me, *Bhabi* (sister-in-law) for young women. There are also three terms in Bengali for 'you': '*Tui*' used in affectionate, contemptuous or solemn addressing; '*tumi*' is used as a term of affection for intimate persons and '*apni*' used for respectful persons. I avoided *tui* and always-used *tumi* or *apni*. I was very careful to address them, because they would think that I was ignoring them and they would not co-operate with me or may create problems for me to stay there. At the beginning, they addressed me as 'sir'. In Bengali, 'sir' means teacher or high official person. It seemed there remained a gap between them and myself. I

[4] In 1996, December, when one farmer (Mr. Nazim) was sinking his shallow Tube well pipes on a corner of his plot, natural inflammable gas emerged from his pipe hole. Villagers thought that there was a gas reservoir in this area and these foreigners were collecting gas.

requested them not to address me in such sophisticated term. I told them that, I prefer *bhai* instead of sir, and after few months, I was their *bhai* to young people and *bapu* or *babaji* (like son) to the aged people but remained 'sir' to Azahar. I failed to persuade him. He thought that I was his boss, so he should address me as 'sir' not *bhai.*

During my fieldwork, I was careful about my position and always remembered that I was working in a remote Bangladeshi village. Here any misconduct would be considered as impolite behaviour and might create problems when trying to establish good rapport with people. Villagers did not have any idea about this type of research where researchers stayed in a remote village for a long time, sharing their common commodities, living with them as one of them, who showed respect to them, came to learn from them.

As a native Bengali speaker I could communicate with the villagers in the local dialect. Even then there were some problems in understanding some local terms. For example, in standard Bengali, low means *nichu* but in Ujankhalsi they use *chapore* or *laol* instead of *nichu.* Ditch, in Bengali, is *doba* whereas they use *maital,* but they also use the term, *maital,* for a kind of soil. Villagers also use language containing metaphors and symbols. For example, *Pashchim* means the West. But they sometimes use this term to indicate Mecca." I 'm planning to go to *Pashim*" means one is planning to go to Mecca for Haz (pilgrimage to Muslims)). I thought that it could lead me to mistranslate the meanings. So I began to learn these local terms and their meanings from Azahar. This enabled me to understand covert and implicit social patterns of behaviour without the risk of foreigners' misinterpretation.

2.2.3 Accessing the Information:

Before beginning my research I worked out a basic plan of campaign. This necessitated learning about local perspectives (ecology, agriculture, livelihood pattern, and social behaviour) (Figure 2.1). I visited different parts of the village and local markets. I talked with local people. Gradually, I became acquainted with the local perspective. I spent nearly two months gathering ideas about the locality and establishing a work base (field house). Electricity was not available for me for two months. However, once a generator was installed, its novelty attracted local people to the field house, which proved advantageous to my research. Informal discussions took place over tea and *bidis* (a kind of cigarette). Often we talked about agriculture related topics, market prices of their products and commodities, their livelihood, etc. When farmers went back to their houses, I used to write down those discussions in my notebook. This 'informal discussion' allowed me to learn about the prevailing constraints and opportunities of the villagers.

Use was made of semi-structured interviews i.e. seeking answers to set questions and obtaining comments by use of open ended questions. This proved an excellent way of obtaining information about agricultural practices and livelihood patterns. When I interviewed older people, I was able to investigate the processes of change within their society and locality. I found that they perceived the conditions worsened with time and that they were worried what would happen in future. The setting for interviews, I considered to be very important. Therefore, when I asked informants about their soil or crop management, I did this on the field, so that the matters under question were before them and this encouraged ready response. For livelihood pattern or crop planning, I asked questions in their homestead areas during late evening when informants were relaxed and had enough time to talk with me.

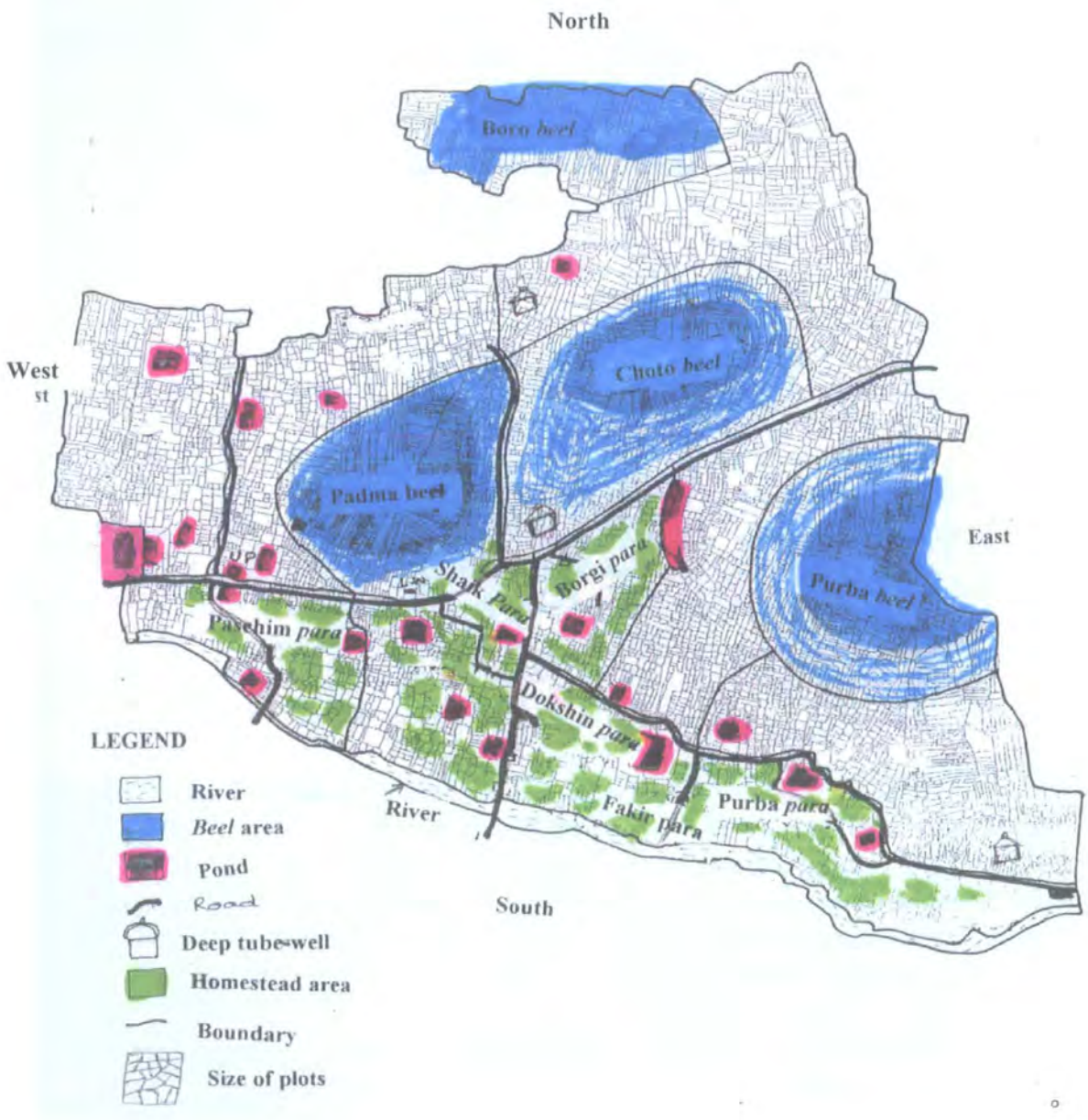


Figure 2.1 Map showing socio-ecological setting of the study area

Those discussion and findings could be used to verify information given during discussions with farmers who visited me at the field house. During the interviews, sometimes I found that people were reluctant to share their knowledge about 'hardship experience during the lean period', 'land mortgaging', etc. with me. Therefore, I attempted to discuss similar problems and methods of overcoming them in other regions of Bangladesh. Sometimes they reacted and shared with me their own experiences and some cases, such as household loans, they did not. In the latter case I did not proceed further. Sometimes I found people were providing false information. This is, mostly, in case of their farm management cost, market price of their produce, etc. In this situation, I asked similar question to them in several occasions to cross check the provided information and, most of the time, I found information was not same. After probing all these with them, I came to understand the real information.

Being a man, I had some problems when seeking to interview women. In Bengali culture, women are not supposed to talk with outsider-men under any circumstances. Women only feel secure among other women in their homestead areas. So to collect information from them, I was assisted by two young ladies from the village to carry out my work. I instructed them and they accompanied me during the interviews. I was, also, selective in choosing women informants. I preferred to interview women whose husbands or young sons were acquainted with me. This was not an ideal method and could distort my findings.

Participant observation. In-depth interviews along with PRA (Participatory Rural Appraisal) methods can result in valuable information, but participant observation can complete this information and sometimes helped to obtain additional information

which would not be possible by other methods. When I visited crop-fields, I observed farmers' activities, how they tilled their land, how they were transplanting or harvesting. Sometimes I participated by helping them with tilling, harvesting of crops or with weeding for few hours (Figure 2.2). Although the farmers found this amazing (because I did not know their proper techniques), they felt that I wanted to learn from them. This helped me to establish close links between us. I observed many ordinary and everyday routines of the farmers. This helped me to get to know the various techniques used by farmers at different times and in different places. Besides these, I also participated at various occasions such as meetings, ceremonies, and recreational activities e.g. music, drama. etc. While attending those events, I spent most of the time observing people, how they work, react or think. In the beginning they also watched me closely but later they did not follow me about, as my activities became familiar to them. Sometimes they asked me about my opinion and feelings. This encouraged me to share my views with them. I was also able to gather ideas about the impact of ecological factors on agricultural activities, government and non-government organisations' activities, and national and international market forces on rural life, etc.

Figure 2.2 Researcher is participating in farming activities

Key informant. Some of the information I received from key informants. During my fieldwork, I was able to make effective contact with some farmers. We communicated as well, but I found that not all farmers had a sound knowledge about other villagers or their locality but some had, so I decided to accept them as my key informants. I had seventeen such key informants, from whom I received information regularly. These informants were from different socio-economic categories and different ages. They are:

Table 2.1 Name of the key-informants with their socio-economic categories.

Name of the farmers	Socio-economic groups	Age (years)
Sayed	Rich farmer	42
Rahman	Rich farmer	62
Ansar	Rich farmer	43
Khalek	Medium farmer	51
Atiq	Medium farmer	33
Nakibuddin	Small farmer	40
Tajimuddin	Small farmer	38
Jamal	Small farmer	35
Kamal	Small farmer	28
Jeher	Small farmer	78
Atahar	Poor farmer	38
Nazrul	Poor farmer	55
Foez	Poor farmer	48
Kalimuddin	Fisherman and poor farmer	46
Khalil	Fisherman	42
Rokey	House wife	30
Aleya	House member	28

Through these techniques, it was easier for me to know when, where and why farmers selected which crop to plant and how farmers were maximising their opportunities within prevailing constraints.

Wealth Ranking. At the beginning of my fieldwork, I conducted a reconnaissance social survey (RSS) by the help of a short 'structured questionnaire'. The result from this survey provided information about the amount of land and number of members in each household. Gradually I came to realise that some villagers sought to hide information about their land. For example, Amir provided information that he had 47 *bigha* of land but practically he had more than 100 *bigha* of land. Another discrepancy I found that the amount of land should not be the only index of household's status. There might be some other sources of income, which can contribute to the households' economic condition. From my research point of view, household's economic condition was important, because farming decisions would differ according to its economic strength. However, when I tried to match my collected information with farmers' socio-economic positions (collected by RSS), I found some discrepancies with their recorded farming behaviour. For example, Kalimuddin had 5 *bigha* of land and, according to RSS, he was placed to small farmer group but, in practice, he could not afford the input costs or manage his farm properly. After observing this, I searched for the reasons and I came to know that he had few decimal of land of his own for his homestead and cultivated 4 *bigha* of land as a sharecropper. Then I decided that I should not rely on this RSS data, rather I would need to rank them according to their actual status which emerged from my research.

The total number of households of the village was 458. It was difficult to handle such a large number of households and to rank them one a time. Then I decided to conduct this ranking exercise *para* (neighbourhood) wise according to the local criteria. There is another reason for doing this *para* wise ranking as it is a smaller area and people know each other very well. To select key local indicators of well-being and ill-being

(Chambers, 1997), I arranged a group discussion with my key informants, where I acted as a facilitator of the discussion. After a long discussion, we agreed 5 indicators, which could be used for ranking a person and the villagers could be divided into four groups to meaning their gross economic status. The criteria were: 'quality and quantity of land', other 'sources of income' (if any), amount of 'surplus or deficit of food grains' round the year, 'access to inputs' and type of 'tenancy' (if any) and the groups were rich, medium, small and poor families. To do this, I invited 3 people from each *para*. I selected these informants on the basis that they knew how to read or write and had a good rapport with me. First I briefly discussed with the participants about my objectives of this exercise and then distributed three sets of cards (Grandin, 1988) among three participants (one set for one participant). The name of each household head of the respective *para* had been written on each card. The participant then categorised their *para* people into four groups. This exercise had two stages: in first stage, I allowed each informant to sort cards into groups and in the second stage, I set all cards on the board in group wise and then compared the results of three participants. Some discrepancies arose when attempting to rank some people, and in those cases, I allowed participants to discuss with each other and so arrive at a consensus. When they agreed, I placed these persons into respective groups. In this way I conducted 7 separate sessions to rank people from the seven *para*s of this village.

Focus group discussions. These were held with farmers (normally six to eight of a similar age group with the same socio-economic background) either in crop-fields or sometimes in the field house. I did this after previously interviewing some farmers in the village. I took the opportunity to ask questions about particular features and encouraged them to discuss them. Sometimes, I facilitated discussion by arguing more

specific points. These discussions allowed me to cross check and clarify issues and to further my understanding of them. For soil classification (indigenous) and stakeholder identification, I used this technique to clarify and check issues raised by the farmers during interviews.

Participatory diagramming. To get a total idea of the crop planning of a farmer, participatory diagramming methods were used; one for investigating crop planning and another for the seasonal calendar. To do this, I discussed my views with the participants and requested them to draw a diagram of their crop planning. First they drew diagrams by chalk on the floor and finally on the paper with pen. After completing this exercise, I encouraged them to explain those diagrams, which I noted down. This helped me to understand the various aspects of the farmer's agricultural behaviour and the reasons.

To do this, I selected those informants who had minimum literacy knowledge (i.e. know how to write and read) and to whom I had very good rapport and who were willing to co-operate with me. I invited nine (9) such farmers from different categories.

Farm walks. I sometimes made those alone, at other times in the company of one or two key local farmers with a sound knowledge of the area. These walks helped me to familiarise myself with the geography, and agricultural practices of the area. During these walks, I asked general questions (e.g. flood depth, soil and land type, cropping suitability, reasons for choosing crops, etc.). This is because my intention was to know 'who' was doing 'what', 'where', 'when', 'how' and 'why'. In this way I probed farmers about my observations to access their understanding and interpretation of my observations.

Researchers from different disciplines use PRA techniques to access information. Normally they use these techniques in 'hit or miss' fashions without having any reliable rapport with the local people and stay for only a few days in the locality where they use different techniques to get information. Therefore, they fail to get reliable information. I think that when trust is established between researchers and informants over a decent period of time, these techniques (PRA) could be useful for obtaining authentic information. Otherwise, for an unknown or little known researcher, it is difficult to access reliable information. Anthropologists stay in the research site for a long period, enabling them to establish and, also, maintain good relationship with prospective informants. So they can effectively use these techniques for getting information.

2.2.4 Additional Training of Fieldwork:

Originally, my area of expertise was environmental biology; I had no previous academic background in social anthropological methods for information collection. When I started information collection, I was under the impression that indigenous knowledge meant farmers' technical knowledge. I was also interested in unfamiliar activities of the farmers. In the mean time I collected information on soil indigenous knowledge with a soil scientist. He showed me (from his scientific background) which method is scientific and which can be classified as indigenous knowledge (IK). His ideas matched with my own. So I tried to follow his direction. After four months, I received instruction from my supervisor about the procedure for IK information collection. This helped me to change my way of thinking. At that time I was just collecting information about the physical components e.g. crops, soils, water, etc. and obtained general ideas of farming methods. I did not pay any attention to social

differences (i.e. who is the actor and what is his position in the society, etc.). It was to my advantage that I come from a farm family and, therefore, had some knowledge about farming activities. Although this was in a different area, there proved to be similarities with the cultivation practices elsewhere. Many activities were familiar to me and I avoided those which seemed to me to have no significance.

After six months, I came to United Kingdom to attend a course in social anthropology. Through the course work, I was introduced to the ethnographic methods necessary for my fieldwork and, also, to anthropological studies and theories. Course work gradually changed my way of thinking. I came to learn that IK is embedded within the social system and it would be a great mistake to think it as a separate component isolated from the 'system'. In this social system, different families have different identities and a different way of life. So to understand IK, it is essential to understand farmers, farm families, their beliefs and values and their associated environment. Therefore, I returned to my fieldwork area better organised to investigate the problems both physical and social.

2.2.5 Working Experience with Multi-disciplinary Research Team:

As I noted earlier, I worked in a multi-disciplinary team which was looking into 'finding ways of sustainable development of the floodplain production system'. A number of researchers were involved both from Bangladesh and the UK from different disciplines. When they came to the field house to conduct research, we often had lively discussion about different aspects of research. Some of them also provided advice about my work and gave me additional information about agricultural practices. However, some of them had no idea about ethnographic research and were curious. I think this feedback helped all the researchers.

The data collected from the project was made available to the villagers. We were able to employ some local students as our enumerators, who became familiar with our task. This reduced misunderstanding of our project's aim by the local community. This policy of openness helped me to build up a good rapport with the villagers.

2.2.6 Problems Faced During the fieldwork:

2.2.6.1 Managing the Field House:

The DFID Project established the field house to do research. I was the only person who lived there full-time. As our site manager changed his occupation and shifted his residence from Rajshahi to Dhaka, I had to manage the site for the last couple of months. I had organised different meetings, censuses, and workshops for the project. This proved time consuming and sometimes created problems for my own research work. For example, I had to conduct a 'reconnaissance social survey' (RSS) and a 'ranking' exercise of villagers according to their wealth for the DFID natural resource project. Four young village people assisted me. This information was also useful to me for gaining knowledge about the socio-economic status of village people. I faced my first difficulties while taking the census. Somehow several villagers had come to the conclusion that I was collecting data to help the government to impose more taxes on them. Others thought that I was going to annex their '*beel*' land for commercial raising of fish. One person in the neighbouring village of Ratugaon also suggested to me, " please bring money from your ODA[5] and we shall cultivate fish within this *beel* - 51% of the profits shall go to you and 49% to me. I shall manage the local people". Some people also challenged me when surveying their households and land. Others had other ideas about why I was there. At that time several villagers, with whom I established a

[5] Former acronym of DFID (Department for International Development) of the UK government, standing for Overseas Development Adminstration.

good rapport, assisted me, helping to clarify the project's aims. From that time I started to take part in all sorts of activities so as to become more familiar with them and to clear away all misconceptions from their mind.

At one point the DFID's, LWI project wished to do some intervention work in the village. For this reason, they instructed us to conduct a 'problem census'. This was done by the 'group discussion' method. The group members were selected on a random basis (random sampling) from their respective socio-economic groups and invited to take part. They were given a payment at the end of the sessions. This made other people (who were not invited) unhappy, as they did not get any money from the project. Later they were reluctant to provide any information. Those who were paid were happy and behaved more friendly towards us.

After few months of 'problem census' meetings, the LWI project conducted a four day 'village workshop' to select one problem from as many as fifty problems raised by villagers. Again group members were invited into the workshop to isolate one problem. In the last day of the workshop the result was displayed in front of all participants and found that it was the 'congestion of *beel* water during *boro* cropping season'. Rich and medium farmers were in favour of draining out the water by digging a canal, so that they would be able to cultivate more land during the dry season. Fishermen and poor farmers wanted to excavate the bottom of the *beel* to harvest water and conserve fish there because they could then catch fish all year round. When the villagers saw the result, rich and medium farmers thought that we are favouring the fishermen and going to excavate the bottom of the *beel*. This created conflict among villagers.

One farmer said to me:

> " you are creating conflict among us. Why have you arranged this type of workshop? Who will look after the fishermen after your leaving"? In the workshop another participant said: " This is nothing but to create conflict among us. They will go back and we will have to quarrel with each other".

The village elder (*pradhan*) said to the workshop organisers:

> ".. you wanted to know our problems, we have told you. Our main problem is the congestion of water within this *beel*. Most of the villagers wanted to drain out the water by excavating canal. This is the only acceptable solution. Now you are saying it does not fit with DFID or your projected goal. This is our bad luck..."

One researcher (natural scientist) insisted on him cutting short his speech and the village-elder complied. This made him angry and the workshop wound up without any consensus and this made some people angry both with our project and the fishermen.

Here I found researchers were determinists. They had pre-conceptions about intervention work. They thought that they have had got all necessary information which would be helpful for managing local resources sustainably. According to them, villagers were ignorant and there was no value in their opinions. I was astonished that these researchers were using the 'participatory research method' to solve the problem and people that participated with this view that they were going to get an opportunity to do their own development. In fact, I saw that the villagers' opinion was ignored in favour of a pre-determined idea. The natural scientists did not show any respect for the villagers' opinions and aspirations.

The post-workshop situation in the village quickly deteriorated. Some influential persons criticised our work and tried to establish their opinion with other villagers that we had nothing to offer them. The workshop was eyewash, they said:

> "They are going to set up another project by using our name and would misappropriate more money. We should not tolerate this and we should chase them away from the village. They are outsiders and creating conflict among us."

To defuse matters, I kept away from the field house for two weeks and when I came back, the situation was still bad. I continued to communicate with our well-wishers and after few weeks, the situation improved. However, I found that village *pradhan* (village-elder) stopped communication with me. Whereas before this, he often visited me and we had formed a good relationship with each other. Once I asked him the reason of this non-communication. He replied:

> ".... In the workshop, you invited me as village *pradhan* and allowed me to speak. You could not stop me at the beginning of my speech. I think the only acceptable solution of the problem is to drain out the water by excavating a canal not by excavating the bottom of the *beel*. If you don't have enough money to manage this intervention, villagers could help you by supplying labour and I wanted to call the villagers to come with me and LWI to solve the *beel* water problem. I think they will respond on my call....This made me unhappy about these project people."

This is a possible danger, when indigenous knowledge and farmers' participatory research fail to link up effectively with natural resource research. There is no room for showing any superficiality to grasp this knowledge system. We need to do by, interacting with local people as a trusted friend. As Wolf (1984) says:

> "..we do not attack reality only with tools and teeth, we also grasp it with the forceps of the mind - and do so socially, in social interaction and in cultural communication with our fellows and enemies" (Wolf, 1984: 397).

Actually, those natural science researchers failed to understand the local perspective. They did not pay attention to the value system of the local people. They did not have any idea of the local power structure. These researchers also failed to understand the livelihood pattern of floodplain areas. Here livelihoods are complex and diverse. As a

result they failed to perceive the 'reality'. It is not possible for those who do not stay there for a long time to learn something from people. I think it is also not possible for outsiders to impose their ideas on the local community without taking into consideration local perceptions. Therefore, I had to re-negotiate with the villagers, because I needed to stay there to collect information for my own research. This gave me an opportunity to see all incidents from a close at hand. For a student of anthropology, it was a good chance to compare his experience with that of a scientist. The experience related above, inspired me to collect more information about the development activities in rural areas of Bangladesh, which will be discussed in subsequent chapters.

From the problems experienced during my fieldwork, it can be ascertained that although working with a multi-disciplinary research team can provide complementary information, it can result in some difficulties for ethnographers. Ethnographers share views with the local people and their relationship becomes very intimate as they learn to respect each other. In this environment, if there is any conflict or any sorts of misunderstanding between researcher and local people, it is very difficult to gain access to required information.

From my experience, I believe that there is no short-term method for gaining a meaningful understanding of others' knowledge. The time-scale involved in ethnographic research is considerable and may not fit in with prospective development work with its short-term orientation and politically driven need for quick results. Whatever approaches are used in order to discover indigenous knowledge, in the short-term, they are likely to prove unsuccessful, as indigenous knowledge is socio-culturally

embedded. It is complex in nature and needs long and careful research (Sillitoe, 1996). While there may be a place for PRA (Participatory Rural Appraisal) or PLA (Participatory Learning and Action) and certain other methods in some development context, they cannot be a substitute for anthropological research. It may take a considerable period, for someone to become familiar with a region in order to gain a meaningful insight into local knowledge and practices from which to illuminate the technical and other development related problems.

3. THE STUDY AREA

3.1 INTRODUCTION

The environmental, social and political factors in which a particular village exists in rural Bangladesh, has important consequences on livelihood patterns of the people of that village. The aim of this chapter is to highlight these factors in the study village of Ujankhalsi and to show how they determine the natural resource management. The first section will describe the physical factors under which the study village is situated and how those influence the livelihood pattern. The next section will deal with village social structure, describing the composition of households; how different kin relationship are organised and the way these relationships allow people in gaining access to the available resources. The last section will examine the political structure of the village and show how the village leaders maintain the integrity of the village people and finally it will unfold the interrelationship of the physical and social aspects of the village in determine the natural resources management.

3.2 PHYSICAL ENVIRONMENT

Ujankhalsi is one of 85,650 villages in Bangladesh. It lies in the north-west of the country, 40 km from the district town of Rajshahi, under the jurisdiction of Durgapur *thana* (police station) which is 8 km. distant, and in the Union of Kismatgankair (Figure 3.1) (Table 3.1). The village comprises 458 households and has a population of 2,043 persons (in 1999); its surrounding farmland extends to an area of 756 acres.

Table 3.1 Administrative structure of Bangladesh, showing place of Ujankhalsi village.

Strata	Name of the strata	Area (sq.miles)	Comprising units
Country	Bangladesh	55,198	-
Division	Rajshahi	13,460	6 divisions in Bangladesh
District	Rajshahi	3,682	16 districts in Rajshahi division
Thana	Durgapur	80	32 *thana* in Rajshahi district
Union	Kismatgankair	12	7 unions in Durgapur *thana* **
Village	Ujankhalsi	1.5	15 villages in Kismatgankair union

Sources: * Government of Bangladesh (1995)
** Local Union Council office

It is a remote village as until 5 years ago, there were no metalled roads. Now one metalled road passes through the village to connect it with the *Thana* headquarters and other nearby markets. This is the only means of access to the wider markets and to contact government officials. The other main paths in and around the village are muddy roads. The settlement of houses in this village and surrounding areas are dispersed rather than nucleated. The reason for this is the fairly high level of the annual floods. In order to keep the houses above the water level; it is necessary to erect the houses on the highest ground, normally 5 to 8 feet above the plain's agricultural land.

3.2.1 Climate

The climate is generally sub-tropical, characterised by high temperatures, heavy monsoon rains and high humidity (Table 3.2). In nearby Rajshahi town, the minimum temperature in May 1997 was 37°C and minimum temperature in December was 9°C. During the monsoon, the temperature usually rises to around 37°C, decreasing to about 9°C from late September throughout the winter until early February. Mean annual rainfall varies from year to year. In 1997, 2006 mm. of rain fell in Rajshahi.

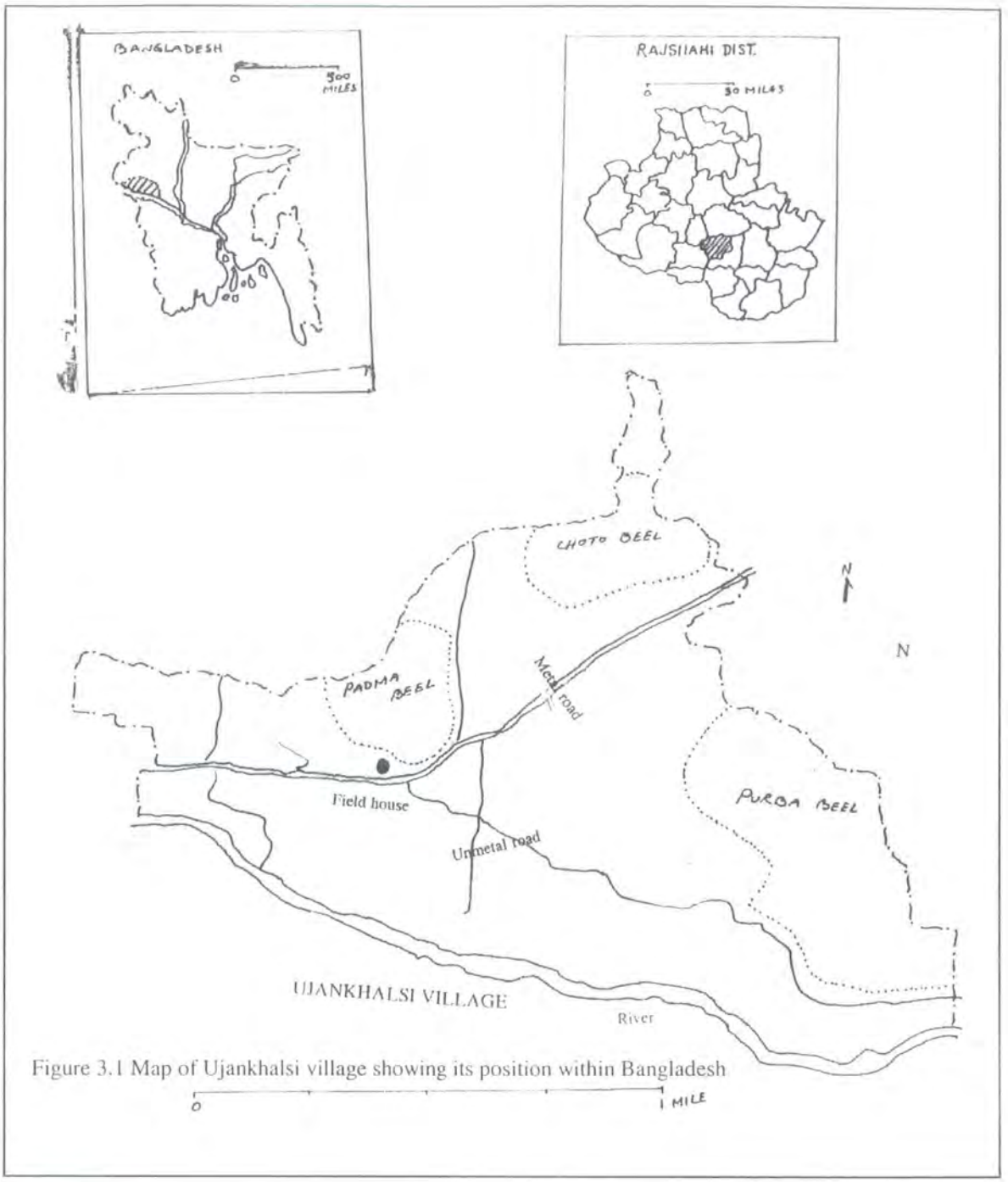


Figure 3.1 Map of Ujankhalsi village showing its position within Bangladesh

The rainfall pattern is seasonal with most of the rain falling during the monsoon from June to September (nearly 85% in 1997; 1725mm. out of total 2006mm.). This seasonal variation of rainfall and temperature influence the farming practices of the local people.

Table 3.2 Monthly average minimum and maximum temperature and rainfall at Rajshahi station, 1997.

	Jan.	Feb.	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Min. Temp^{0}C	9.0	12.3	17.2	22.9	25.6	25.6	25.0	26.0	25.4	23.7	16.1	12.4
Max.Temp ^{0}C	24.3	27.7	31.5	36.9	37.0	33.7	32.2	31.3	31.0	32.1	28.6	25.1
Rainfall mm.	08	35	19	57	49	259	674	503	339	043	44	02

Source: Bangladesh Bureau of Statistics, 1997.

3.2.2 Seasons

The above climatic variation is similar throughout the country and on the basis of this variation; the Bengali calendar is divided into 12 months. The months with their equivalent English ones are shown in Table (3.3). The Bengali months are collected together into six seasons (Table 3.4).

In Bengali, *sheet* (winter) is the season of vegetables and flowers. Many cultural activities, related to agriculture, take place during this season which lasts from *Agrayan* to *Magh* (November to February). The trees blossom in succession from *Phalgun* to *Jaishtya* (February to June). Summer begins in *Chaitra* (mid March), when there are northwesterly rains. The last week of May or first week of June marks the end of the summer though high temperatures continue until mid-October. In summer, there

are hot rainless days and sudden thunderstorms. From then on, rain begins with some interludes until *Ashar* (early-July), when the monsoon rains start, although it varies from year to year.

Table 3.3 Months of Bengali calendar with its English equivalents.

Bengali months	**Equivalent English months**	**Bengali months**	**Equivalent English months**
Baishak	Mid-April to mid-May	*Kartik*	Mid-October to Mid-November
Jaishtya	Mid-May to mid-June	*Agrayan*	Mid-November to Mid-December
Ashar	Mid-June to mid-July	*Poush*	Mid-December to Mid-January
Sraban	mid-July to mid-August	*Magh*	mid-January to mid-February
Bhadra	mid-August to mid-September	*Phalgun*	mid-February to mid-March
Ashwin	mid-September to mid-October	*Chaitra*	mid-March to mid-April

Table 3.4 Seasons of Bengali calendar with its English equivalents.

Bengali seasons	**Bengali months**	**English equivalent**
Grisma	*Baishakh* and *Jaishtya*	summer season
Borsha	*Ashar* and *Sraban*	rainy season
Sarat	*Bhadra* and *Ashwin*	autum
Hemonto	*Kartik* and *Agrayan*	late autumn
Sheet	*Poush* and *Magh*	winter
Bosonto	*Phalgun* and *Chaitra*	spring

From the agronomic point of view, there are three main seasons. At the beginning of summer, there is little rainfall with high temperature and the potential evapo-transpiration (PET) rate remains higher than the precipitation. This is the beginning of *pre-kharif* (*aus*) season. Gradually rain begins but temperature remains high until October and the PET remains lower than that of the precipitation, this is the *khari*

(*aman*) growing season. This is followed by *rabi* growing period when PET remains high than rainfall, temperature gradually goes down and crop growth depends on residual soil moisture. The farmers of Ujankhalsi village think in terms of three cropping seasons, one divided into two sub-seasons, under this climatic regime.

Table 3.5 Cropping seasons by months

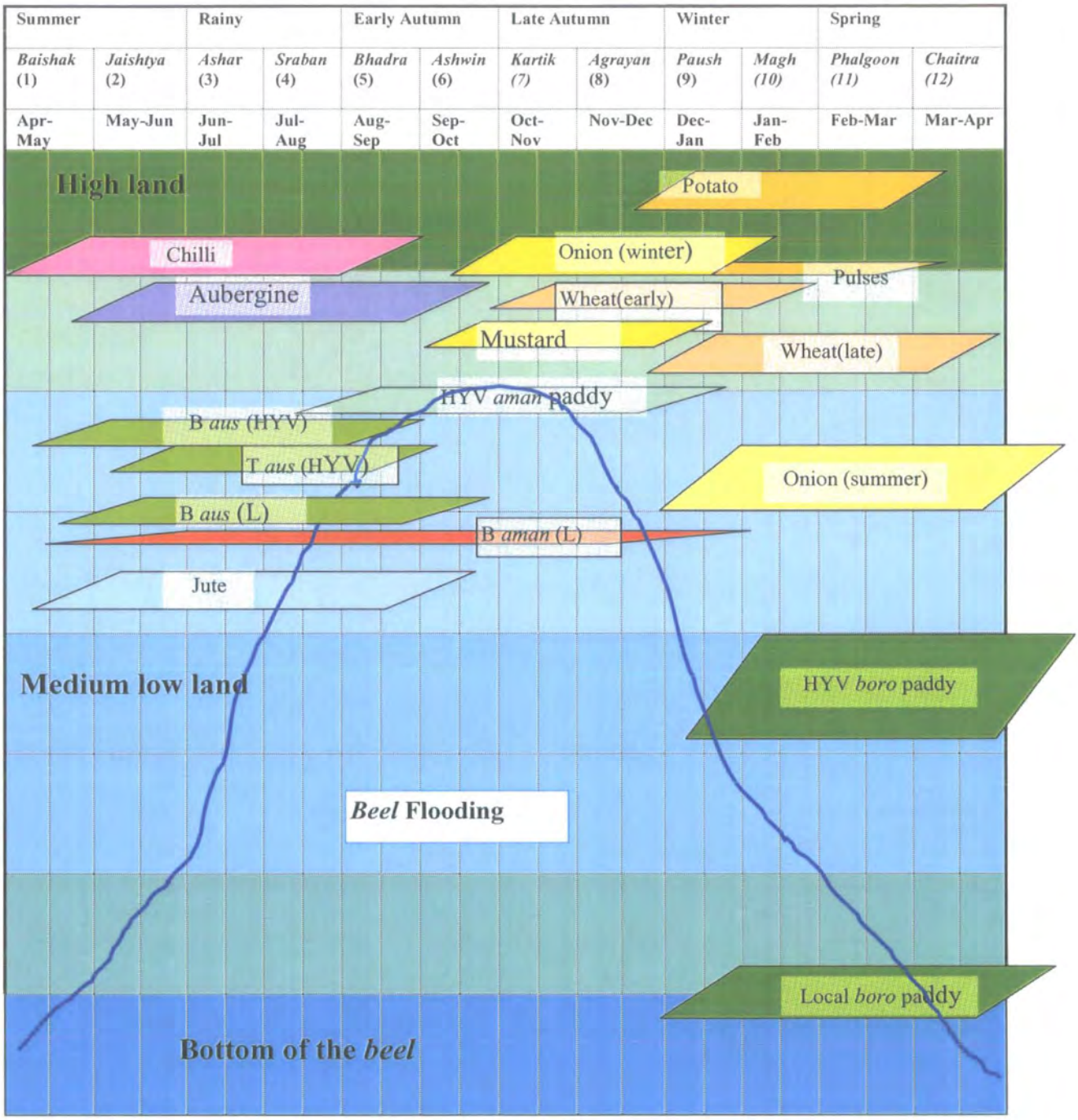
1. *Aus* season (Pre-*kharif)*	March to mid-August
2. *Aman* season *(Kharif)*	Mid-April to early January
3. *Boro (Rabi)* (season)	Late September to mid-June
a) *Chaitally* (early)	Late September to early January
b) *Boro*	Mid December to mid June

The *Aus* season starts before the arrival of the monsoon, when farmers select crops which can tolerate drought in their first growing stage and, later, can flourish with abundant rain and floodwater. *Aus* paddy and jute are suitable crops during that season in the *beel* area. The *Aman* season is the monsoon when much water remains for the *beel* area and farmers cultivate rain-fed crops on their suitable land. *Aman* paddy is the usual crop. This was once the main cropping season for farmers. Now, in addition to rain fed agriculture, there is dry season cultivation with the introduction of irrigation facilities. When the floodwater begins to recede, farmers start their dry season cultivations. They grow mustard, winter onion, vegetables and pulses in the *chailtally* season and *boro* paddy and summer onion in the *boro* season. The diversity of *chaitally* crops is now decreasing with increasing dependence on *boro* cultivation with its higher yields (see Figure 3.2).

3.2.3 Hydro-ecology

The section discusses the hydro-ecological feature of the study area. Ujankhalsi is situated on the broad high North Ganges floodplain, which stretches from Premtali in

Figure 3.2 Cropping pattern in relation to *beel* flooding in Ujankhalsi village.

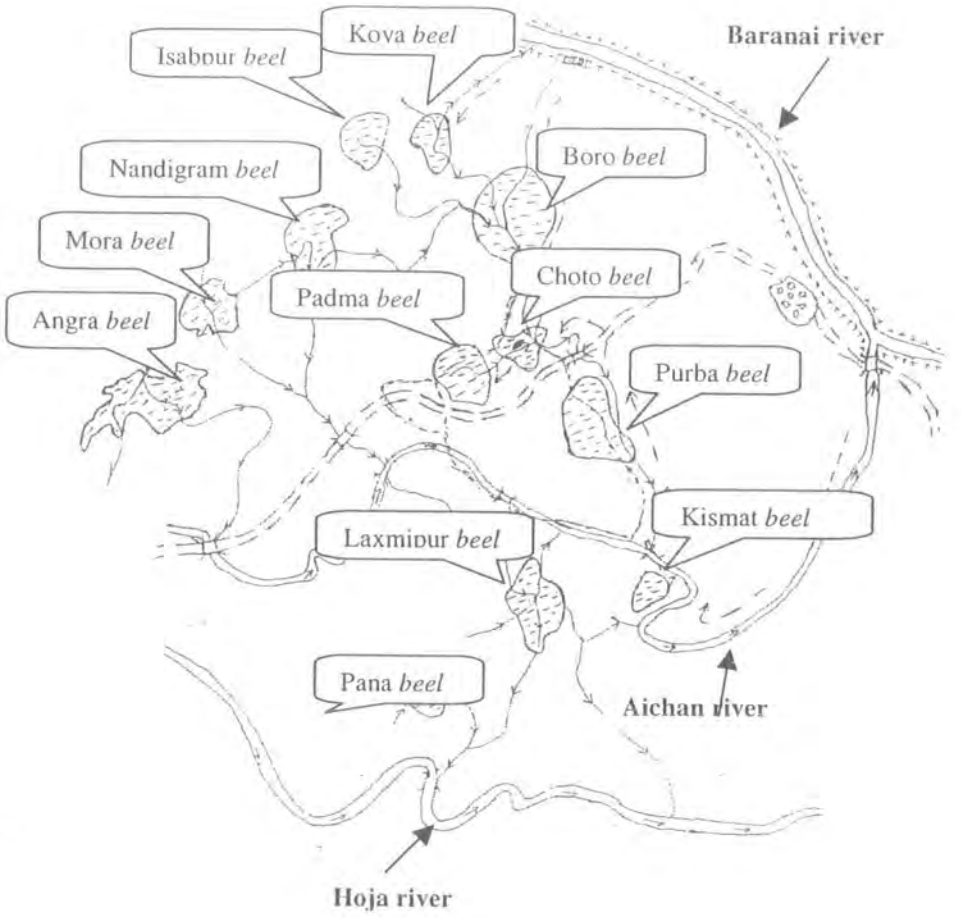


HYV = high yielding variety, L=Local variety, B= Broadcast, T= Transplant.

Godagari *thana* to where Sujanagar *Thana* slopes down onto the Jamuna floodplain. The southern part of this floodplain covers Bagmara, eastern Paba, northern Puthia, Durgapur and Mohanpur *Thana* (Rashid, 1991). The river Ganges is today 18 km. to the Southwest, connected to the village by several canals and small rivers. The hydrology is complex, like that of most floodplain areas. Numerous lakes such as Boro *beel*, Angra *beel*, Mora *beel* surround the village. There are also *nadi* (rivers) and *khal* (canals) connected by numerous *dara* (channels).

At the beginning of the monsoon rain, land starts to go under water. The flooding occurs with incoming floodwater from rivers unable to cope, and congestion of rainwater falling on the land. There is now a *band* (embankment) along side the Branai river (2 km to the north of the village) which delays the arrival of water in the village. Water from neighbouring *beels,* at higher elevations, begins to flow down into the of Ujankhalsi *beels* by late July to early August. These drain out through Choto *beel* and Purba *beel* into the Aichan river, which flows along the southern side of the village. These two *beel* act as a drainage basin for the nearest seven *beel* (though it may extend as some villagers believe, to as many as 22 neighbouring *beel*) (Figure 3.3). The slow rising of floodwater is welcome, so that crops such as jute, *aus* and deep water *aman* paddy can survive and flourish. However, if the flood comes suddenly or is severe in nature, it is destructive. Flooding does have positive consequences. It brings in fish and also fertilises the land by depositing silt. It also replenishes the aquifers exploited in dry season irrigation by shallow tube-wells and deep tube-wells.

In this village all land is not suitable for all crops in all seasons. Some land is normally flood free. This is high land and is used mostly for settlement and some crops. Others



Legend:

	Beel		Breach on the embankment
	River		Road
	Canal		Culvert
	Sluice gate		Village Ujankhalsi
	Water flow		Hut (weekly bazaar)
	Embankment cum road		Deep tubewell

Figure 3.3 Hydrology of Ujankhalsi

are occasionally flooded and these are medium high land; about 60 per cent of the village's land is 'medium' to 'very low' land and prone to flooding during the monsoon. Moreover, natural hazards (early flood, severe long staying flood, drought, etc) play a part in restricting farmers in their attempts to cultivate plots. Farmers consider flood depth and its duration when making cropping decisions. The land, which is suitable for three crops, is known as *te-fosli jomi* (tripled cropped land). Some plots are suitable for two crops per year, the *do-foshli jomi* (double cropped land) and *ek-fosli jomi* is cropped once. The latter is mainly low to very low land. After the introduction of irrigation facilities in the dry season, most of the land of this village is under agriculture during the dry season.

3.3 SOCIAL STRUCTURE

The Village people in rural Bangladesh are organised into various kin units such as *ghor* (room), *bari* (home or household), *bongsho* (lineage), *goshthi* and also arranged into some geographical units *para* (neighbourhood) and *gram* (village).

3.3.1 The Household - *Bari*

In Bengali, the term *ghor* means 'room'. In Ujankhalsi it also refers to a nuclear family, that of a husband and wife and their children. Although they may occupy the same homestead as the man's parents with his unmarried brothers and sisters, who work as an independent economic unit. The *bari* means 'household' but it can also be used in reference to the extended family in which there is a shared economy. In this case, the term *ghor* is used for a room e.g. *pakghor* (Kitchen), *soberghor* (bedroom). When one extended family separates into several nuclear families and each nuclear family still lives in the same homestead area, each family is then called as *ghor*. However, if these

nuclei families move away from the previous homestead and live in their separate new dwellings, these are referred to as *bari*.

In the *bari*, the head is usually its oldest male member (though occasionally a widow may be accepted as the principal authority). Its members usually comprise this man's wife and children, but it may also include unmarried and married sons and their wives, unmarried or widowed or divorced daughters, grandchildren and sometimes a married daughter, whose husband comes as *ghor-jamai*[1] (a bride-groom who lives in his in-law's house) to live with them. The *bari* is an economic unit, working under the guidance and leadership of its head, from whom it obtains its identity and status. Family ties are very close within a *bari*. Men's duties go beyond the *bari* to the wider village, whereas women's are more restricted to the domestic sphere. For the convenience of my discussion hereinafter I use 'household' instead of *ghor* or *bari*.

As the household is a basic unit of production and consumption, it is essential to understand how it is constituted, the mechanism by which the members attain their livelihoods. I encountered some problems when I wanted to make a list of all households in the village. A survey was conducted when four villagers assisted me, and then it was found that there were 441 households, but, when later, I investigated each household to get more in-depth information I found that there were in fact 458 households. I found several cases in this village where the production unit did not overlap with the consumption. For example, several wage labourers stayed in rich men's house as a contract-labourers[2], received their meals there but supported,

[1] Bride-groom lives in his in-law's house and enjoys economic facilities there, is designated as *ghor-jamai*.

[2] In rural areas, farmers use to keep labourers on contract basis. These labourers are not suppose to work for others and worked for employer farmers until the contract period finished.

economically, their families (living elsewhere). Here the labourer is in the same consumption unit as the rich farmer but economically belongs with the other unit. Classification based solely on production and consumption proved not to be appropriate in the study village.

Another example of the difficulty in household classification was when it involved elderly parents and their children. Supporting of one's elderly parents is a strong moral duty in Bangladesh, and it is the norm that the extended family should live nearby. But in practice, where there is widespread poverty, it is difficult to maintain this norm. In some cases of poverty, a man has to separate from his parents in order to cope with the poverty. For old people this can be a disaster as there is no social security. In Ujankhalsi I observed some families, which were difficult for me to place in a specific category. For example, Fozor, father of Kashem and Atiq. In 1997, there were three households. Fozor, a widower, had problems in surviving and was on the brink of starvation. So his two sons decided to share his (Fozor's) expenses six-month each. Therefore, I included Fozor in Kashem's household rather than that of the other brother, as the eldest son of Fozor and, normally, he is supposed to take care of his father (not obligatory).

Sometimes an extended family separates into incomplete nuclear families due to conflicts between family members. Such separation does not have to be permanent and they may reunite later. An interview or a short time survey could reveal either two families or one family but this was only their temporary state. I observed two such families. Mamun separated from his father, Rahman, and formed a separate household. But after one year when Mamun's father was sick, and lacked proper treatment, he

rejoined his father's family in order to look after him. The opposite case I observed in Amir's family. Here the second eldest son of Amir, Sultan, left his parents by setting up a separate kitchen though still sharing the same room, which he had occupied previously. When I interviewed Amir, he hid this, because it embarrassed him. He is one of the rich men in this village. His family is not supposed to disintegrate. When I discussed the situation with Sultan, he indicated that he was determined not to merge with his father's family. Therefore, I put him in the separate household category.

To avoid these anomalies, I placed emphasis on socio-economic factors for defining a houisehold and designated 'household' as a basic unit of production, reproduction, and of social and political interaction.

As social beings, different households have different goals and different capabilities for addressing what they perceive as problems. As the main concern of this thesis is to explore the role of indigenous knowledge in the farmers' decision-making process, it is essential to categorise different households into meaningful groups. This will reveal how this knowledge is patterned in the society and also to get an idea who is doing what and why from a group perspective.

However, it proved difficult to place the villagers into distinct groups. Researchers have used different indicators to classify them according to their research needs. Sagir (1973) and Schendel (1974) divide villagers into two major groups: farming community and non-farming community. This was not appropriate for the Ujankhalsi situation, as there are non-farming families in rural areas that are not directly related to agriculture but have influence on agriculture, for example, the blacksmith. How could

a farmer continue his job without a blacksmith? Who will prepare his implements? They are also a part of the farming community. Some of them also act as part-time labourers.

Qadir (1964) divides farmers of Dhanishwar village on the basis of 'functional control over land'. This method also creates a problem in placing the farmers of the study area into appropriate categories. There are some 'farmers' who rent land to sharecroppers. Therefore, they do not function as farmers on this land but as landowners. So they should be treated as being in a lower category but, actually, they do not belong in that group. For example, Miraj, a rich farmer of Ujankhalsi village, is doing a job in a school and leases out all his land for sharecropping. He is getting a share of the produce according to the agreement with the sharecropper. In true a sense, his land does not functionally belong to him, rather to sharecroppers. Therefore, I avoid using Qadir's method as this would classify him as a 'poor farmer'.

Wood (1976) divides villagers on the basis of 'income from utilised land'. He does not indicate anything about other sources of income. There are some farmers in Ujankhalsi who have income from other sources than land. They would appear to be poorer than their actual economic position, if I classified them on the basis of this criterion. For example, Ahmed has only one acre of land under cultivation. But he has a business enterprise in the Taherpur market, where he earns very good sums of money every year. According to Wood's criterion, he should be put into a lower class, but actually he does not belong in this class.

White (1992) divides farmers of Kumirpur village into four groups, upper stable, upper vulnerable, lower stable and lower vulnerable. She does not provide any indicator of

how she grouped farmers into 'stable' and 'vulnerable'. For me, it was difficult to measure farmer's 'stability' or 'vulnerability' in a risk prone area, such as a floodplain, within this short time. Moreover, there is a medium group of farmers who are more or less self-sufficient and play a vital role in the rural economy. They sometimes become 'stable' or 'vulnerable' in respect to the seasonal variations. So I could not follow this system of classification in my studied village.

The Bangladesh Bureau of Statistics considers quantity of land to classify Bangladeshi farmers. It divides farmers into four groups: landless, small, medium and large farmers. In Bangladesh, productivity of land is not equal. It varies from place to place. Even at village level, all lands are not equal in terms of quality. So this classification is a generality.

To overcome this problem, I used a 'participatory ranking exercise' where farmers took part in the ranking. By this method, farmers considered 5 main conditions (see chapter 2, page 39). These were: quantity and quality of land and output from it; other sources of income (if any); type of tenancy (if any); amount of surplus or deficit round the year and access to input. They divided themselves into four classes using their determinant to wealth in their country's context:

Rich farmers: They have plenty of land to cultivate and, normally, give land or lease out land for sharecropping, and never cultivate others' land. They may have other occupations, which sustain their families. They placed Mirja and Ahmed (see above) in this group. A problem occurs in the case of Ansar who has 3.30 acres of land. According to the land size, he should be in the medium group. But as he is running a

deep tube-well which supplies water to over 100 acres. He provides all running costs for this irrigation scheme and in return gets one-fourth share of the produce from all those plots in return for water. He has also a rice huller mill. So this means that he has enough surpluses and, therefore, the key informants put him in the 'rich farmer' category.

Medium farmer: They have sufficient land to meet their needs. They have some surplus but not as much as rich farmers. If they have another occupation, they can maintain their families moderately. They may or may not lease in land out for sharecropping or mortgaging. Sometimes they may lease land for sharecropping or mortgaging. Normally, they do not work as labourers; they hire labourers during cropping periods. They can afford inputs for cultivation.

Small farmer: Farmers of this group do not have enough land to meet their needs. Often they have to take land for sharecropping. They also have a food grain deficit for at least two to four months of the year. If they have other sources of income as well as agriculture, their total income is still insufficient to fulfil their deficit budget for the whole year. Sometimes they sell their labour in order to manage their deficit. In some cases, they have to lease out land for sharecropping or mortgaging (details will be discussed under 'access to land'). They have problems in buying inputs for cultivation, and to do this they have to borrow items or money from other people.

Poor families: Most of the cases they have very little or no land of their own. Mainly they depend on selling their labour. Some of them sharecrop others' land. However, they have a food grain deficit most of the time. If they have another source of income,

they earn little and so it is difficult to support their families. They have problems in buying implements and inputs. They are the most disadvantaged group of people.

From an occupational point of view, it is difficult to separate floodplain families from distinct occupational groups as they have diverse livelihoods. They integrate different economic activities from which they might earn a part of their livings. For example, most of the people depend on fishing either for diet or to earn money for subsistence. The following classification is based on the major sources of income of farm families.

Table 3.6 shows that there are 14 families of rich farmers, who have other sources of income. They have enough land for subsistence. Even then they are expanding their sources of income. So they are in a better position than other groups. In the medium group, 21 families have other sources of income than agriculture. They have also the opportunity to be educated, to get employment or to set up in business. None of these two groups (rich and medium), want to rely on agriculture, because its profitability is declining. Whereas, in lower medium groups, 40 families have other sources of income than agriculture and 2 have fishing as their other profession.

To cope with the situation, they are diversifying their occupations. Some of them are active as seasonal labourers. They have to struggle hard to maintain their economic situation. Among poor families, there are 21 families who are dependent on fishing. 31 families have changed their activities from labourer to that of van puller (sometimes they also engage in seasonal labour) and 32 families have set up small business enterprises. This diversification of occupation indicates that they could not subsist on agriculture and to manage their livelihood, they are seeking other occupations.

Table 3.6 Occupational categories in accordance with economic status of farmers in Ujankhalsi village.

Occupation	Rich farmers	Medium farmer	Small farmer	Poor families[3]	Total
Agriculture	10	64	77	148	299
Agriculture plus other job	11	5	7	1	24
Agriculture plus commerce	3	16	33	32	84
Fishermen	0	0	0	4	4
Fishermen plus agriculture	0	0	2	14	16
Van[4] puller plus agriculture	0	0	0	31	31
Total No. (%)	24 (05)	85 (19)	119 (26)	230 (50)	458 (100)

From the above Table it can be seen that different categories of households adopt different strategies for attaining their livelihoods. Beside these households, there are other kin units which are also functionally linked with each other in the prevailing socio-economic system.

3.3.2 The *Bongsho / Goshthi*

The *bongsho* comprises agnatic relatives organised into a lineage. The members can trace their origin to a common male ancestor, all being patrilineal descendants of the same great-grandfather. They have a sense of belonging that binds them together.

The *Goshthi* is a wider group than the *bongsho*. It means 'kinsmen'. The members of a *goshthi* may or may not be able to trace themselves back to a common ancestor. A single *goshthi* may comprise different *bongsho* living in different villages. *Goshthi* affiliation determines ones prestige and power in the village. The two influential *goshthi* in Ujankhalsi are Sarker and Shaik *goshthi*. The members of Sarker *goshthi*

[3] 2 beggars, 3 carpenters and 3 blacksmiths are included within this category.
[4] Van is a tricycle non-motorised vehicle (like rickshaw), mainly used as carrying men and agricultural goods in rural areas.

claim that their forefather dominated the village, undertaking many social services. Members of Shaik *goshthi* are also proud of their high status title. I observed that there is still some competition between the members of these two *goshthi* to gain dominance over each other. Other *goshthi* such as Pramanik, Mondol and Sarder can claim a certain social status. Table 3.7 shows that 9 (nine) *goshthi* have 10 or more families in this village. In rural Bangladesh, people show respect to any *bongsho* or *goshthi* according to its local prestige.

Table 3.7 *Goshthi* members of Ujankhalsi village, according to farmers' group.

Name of the goshthi	Rich farmer	Medium farmer	Small farmer	Poor families	Total
Pramanik	7	31	51	115	204
Mondol	7	24	26	34	91
Sarker	3	7	7	15	32
Mollah	1	4	6	13	24
Shah	-	5	8	10	23
Shaik	3	3	4	11	21
Sarder	1	3	3	6	13
Sakinder	-	2	5	4	11
Khan	1	3	3	3	10
Karigor	-	-	-	6	6
Mridha	1	-	2	2	5
Kazi	-	-	1	4	5
Talukder	-	-	-	4	4
Fakir	-	1	1	1	3
Shikder	-	2	-	-	2
Munsi	-	-	2	-	2
Bagati	-	-	-	1	1
Khandoker	-	-	-	1	1
Total	24	85	119	230	458

In Ujankhalsi, *goshthi* has an important political role. The Sarker *goshthi* is the most influential because they have close links with the Pramanik *goshthi*. They traced descent from the same ancestor (Fig. 3.4). When their ancestors first came to settle in this village, they were, Pramanik. Edul and Meher were two brothers. Meher's descendants remain under pramanik *goshthi* but Sarai, the son of Edul was appointed

as tax collector by the *Zaminder* and from then on he changed his surname from Pramanik to Sarker. After that, Sarai's descendents were known as Sarker. Members from each *bongsho* recall this history and believe that they have descended from the same ancestor. When necessary, Pramanik *goshthi* give support to the Sarker *goshthi* and vice versa.

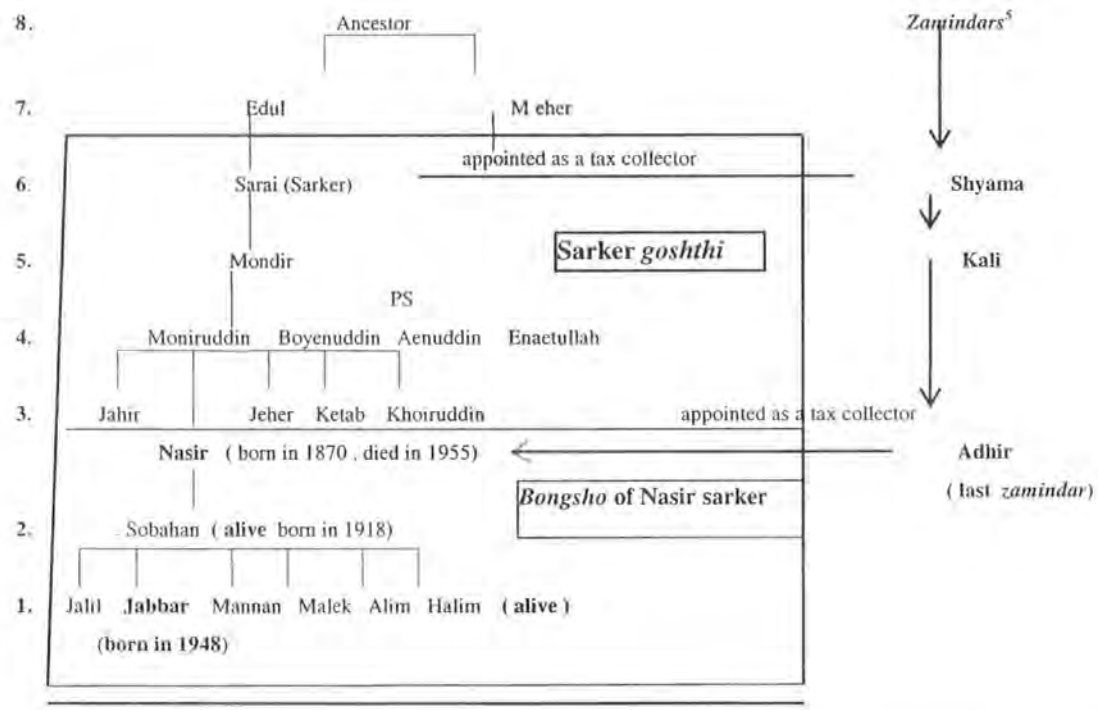


Figure 3.4 Diagram shows the *bongsho* (---) and *gushthi* (———) composition of Sarker families in Ujankhalsi village.

These *bongsho* and *goshthi* have an impact on resource management. Although their ties are weakening, they still exist, to some extent, in Ujankhalsi village. By giving land for sharecropping, landlords try to look after their kin. For help in distress, people also turn to their *bongsho* or *goshthi* members. In its subsequent chapters this thesis

[5] Feudal landlords, prevailed from Mughal period to the end of the colonial period. They were the representatives of the king / East India Company for collecting revenue. Their right was hereditary and could sell or transfer their right. They also appointed some intermediateries to collect revenue on behaf of them.

will examine how this relationship allow farmers to access resources in order to obtain sustenance and social power.

3.3.3 Marriage and Affinal Relations:

In this section the different aspects of marriage and the ties that are established between the families of the spouses will be discussed. In the context of this study, marriage is important both for socio-political and economic reasons. From a socio-political point of view, a marriage can create an alliance, which can be used for mutual support between the families of the spouses. From an economic point of view, it is an economic transaction, which can constitute a major source of income or expenditure during the lifetime of the family. It also influences farming decisions.

In Bangladesh, except for some tribal people, all have patrineal descent and patrilocal residence and marriage is a dominant feature of social life. Marriages are arranged according to economic considerations and to strengthen a family's socio-political base within or outside the village. Marriage outside the village is increasingly becoming popular with young people. This type of marriage extends ties beyond the village and often strengthens a family's political power. In the study village, there are many steps in the arrangement of a marriage, but the most important and difficult stage is when the marriage payment has to be negotiated by the parental families. In the Islamic tradition, there is system of '*denmohor*'(meher) (security money for the bride). The family of the bride pledges this *denmohor* and this provides some protection for girl against divorce (Jansen, 1987). However, after observing several occasions, it seemed to me that dowries are the means of obtaining a wife. It is often called by the English term 'demand'. It is a demand of the groom's parents or close kin to which the bride's

family has to comply. The amount of dowry is often objected to and bargaining among the parties takes place. Goods i.e. dowry goes to the family of the boy, if the bride and groom are going to live with his parents. It goes to the groom, if he and his bride are setting up a separate home. Therefore, it is the bride's father who has to incur the largest expense in the marriage arrangement. If the bride's guardians fail to pay the whole amount of the dowry at one time or in instalments within a short time, (this could be demanded even after several years), the bride may has to face ill-treatment in her in-law's house.

In Bangladesh, the dowry has an impact on livelihood patterns. It is the transfer of a large amount of assets from one family to another. Schendel (1981) in his study of household mobility in Bangladesh states:

> "A household with many daughters was sure to experience economic deterioration as a result of their marriages. As it was out of the question to leave a girl unmarried, girls were viewed as liabilities to parental households, while boys were viewed as assets" (Schendel, 1981: 109).

White's work (1992) refers to a village of Rajshahi, Bangladesh, where she observed that dowry was common amongst all groups and the amount payable has risen dramatically. In this respect Sharma (1984) mentions that dowry is not the wealth of women, women are the agents through which the wealth is transmitted to men's houses.

Many households in this village faced the problem of having to postpone the marriage of a daughter owing to lack of resources to make an adequate offer to the groom's family. Most of the poor families suffer from this problem. I observed several cases in this village. For example, Aleya, a poor divorced young lady, lived with her mother.

Her brother has set up another household and is living near to his mother with his wife and two children. Aleya has only a few decimals of land of her own. People know it. One marriage proposal came to Aleya's house from a neighbouring village and the groom demand 35,000 Taka (50 taka =$1). Her brother dealt with this proposal. He agreed to give 5,000 Taka but groom's party did not accept this smaller sum. The marriage, ultimately, was postponed. Being a divorced lady, there was less chance for her to get a second marriage. She felt insecure[6] and was eager to marry again. Her brother was her formal guardian. She requested her brother to negotiate with the groom party by offering 25,000 Taka. But her brother did not wanted to offer all that money. She said to me:

> "..my brother does not want to give me in marriage. Because he is getting some help from me. If I'll marry someone, then I could not help him. Now I am a member of a *samity* [7](member of a NGO) and draw a loan from the *samity*. I have also given 3,000 taka to him to run his tailoring business. Although he paid it back by instalments now he is insisting on me to drawing another 4,000 taka to give him again. He thinks if I'll go away from this village, he would miss this opportunity."

A few months later, another proposal came to Aleya from the same village and demanded 30,000 Taka as dowry. Aleya cleverly negotiated this proposal through her maternal uncle and got married without selling her land. She said :

> "I came to know that the groom party knew about my property (land) and I could get 30,000 to 35,000 taka by selling this. So they are demanding this amount. They think that if I have any interest to get married, I could sell it. Can you say what would happen if I would sell the land to marry a man and after marriage he would divorce me? Is there any guarantee? There is no guarantee! So I had to manage it carefully, I agreed that I would pay 25,000 taka after six month of my marriage. I think, within this six months, I could easily 'guess' the man. If he is a good man, I will try to convince him not to sell the land but rather to cultivate it"

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[6] In rural Bangladesh, women do not feel secure without a husband or proper male guardian.

[7] Several non-government organisations (NGO) provide group-based micro-credit for income generating activities to poor rural women. Tthis group is known as *samity*.

Here we see conflict of interest between Aleya and her brother. Her brother was not interested in negotiating with the groom. This was because he had a twofold interest in Aleya; one was if she got married, he would lose the land, which he sharecropped at that time, and the other was that he would lose the opportunity of getting the money from Aleya which he needed for his business. Probably, considering this, he did not show interest in negotiating with the prospective groom's party.

In rural life, people have very complex inter-relationships, In this example, the boy, who is willing to marry Aleya is mainly interested in her wealth (in this instance a piece of land and as she is a member of a *samity*, she could also get a loan) by which he could manage his other resources, particularly agriculture, in a more advantageous way. On the other hand, Aleya needs security, so has to look for a suitable boy for achieving this aim. It is likely that Aleya's brother was afraid that if she got married, he would lose an important resource. Therefore, in case of resource mobilisation, payment of a dowry is an important factor.

Sometimes potential kin relations are calculated according to resource distribution with a proportion of assets distributed via females. The situation of a bride's family is taken into account when deciding whom to marry. Safir, a rich farmer arranged the marriage of his second son to his neighbour's daughter. This neighbour, Abbas's was a medium scale farmer who having only two daughters and no son, meant that all of his property would be distributed, after his death, among his two son-in-laws (Fig 3.5). It seems that here marriage is a means of 'asset transaction', rather than one of mutual attraction.

Figure 3.5 Affinal ties of two families and probable land distribution.

Abbas's *paribar* (family) Safir's *paribar* (family)

Note: ——— = Transmission of land

In this society, there is another type of residence known as *ghor-jamai. Gho-rjamai* refers to when a groom lives with his in-law's family. In Ujankhalsi I found 10 *ghor-jamai* who are living in their father-in-law's house and benefitting from the economic opportunities. This type of marriage has an impact on resource transaction. There are some specific circumstances which encourage this type of marriage. When the family of a girl lacks a son or male members to look after the family's activities, they look for a *ghor-jamai*. Nearly all men who live as *ghor-jamai* are often ridiculed by villagers. From an economic point of view, it is important that if a *ghor-jamai's* father-in-law has no boy (or has a mentally ill boy), ownership of the father-in-law's property is passed on to his wife; not to him. If the wife has more sisters, property will be divided equally between each sister. If there is any special deed (Will), then it passed on according to the will.

3.3.4 Fictive Kinship:

Fictive kin relations may also play a significant part in village life. They include *dosto / meeta* (friendship), *dharma baap* (spiritual father), *dharma ma* (spiritual mother), *dharma bon* (spiritual sister), *dharma bhai*(spiritual brother) etc.

Fictive kinship ties in Ujankhalsi are formalised with rituals and an exchange of gifts. The tie endures as long as both parties are willing for it to continue. Karim (1990) points out that they are usually asymmetrical relationships between patrons and clients, by which the latter maintains prestige in the village. Sometimes this type of relationship allows people to have access to resources which otherwise would not be possible to them. For example, one man, Atiq of Ujankhalsi, made '*dosto*' with another man of similar age who lived in the neighbouring village of Shaympur. They become close friends. Four years ago Atiq wished to buy 2 *bighas* of land, but had insufficient money, his '*dosto*' provided the balance needed to purchase the land. Later Atiq paid him back. Recently, Atiq gave some money to his friend when the latter acquired a public bus service.

Actually in a small-scale farming community where property rights are inherited from generation to generation, different kin relations are so interwoven with their residence, labour and property relationship that households in such a social system can be seen as a functional unit (Netting, 1993). The situation of Ujankhalsi farming community is similar to this view.

3.3.5 Other Social Units

Para: Several neighbourhood *bari* comprise a *para*. A cluster of houses may be divided by a footpath. Some *para* are named after *goshthi*, like the Sarker *para*. People of the same *goshthi* used to live in the same *para* cluster. Other *para* at Ujankhalsi are named after their location within the village: Purba (east) *para*, Dokshin (south) *para*, Pashchim (west) *para* (Figure 3.6). *Gram* denotes a village. Several *para* comprise a *gram*. There are eight *para* in Ujankhalsi. *Grams* are separated from each other by

roads, canals and farmland. Each *gram* has a boundary. Chapter 8 (section 8.5.2) describes the interdependencies of local people within a *para* or village and how different stakeholders play their role from their socio-ecological niche in order to obtain their livelihoods.

3.4 POLITICAL STRUCTURE OF THE LOCALITY

In Bangladesh, homesteads are clustered into local neighbourhood groupings called *samaj* (Betrocci, 1970; Arnes and Beurden, 1977; Jahangir, 1979; Karim, 1990). They share a common identity based on kinship or territory or both. The existence of '*samaj*' was reported in Indian villages long ago (Maine, 1871; Baden, 1896 and O'Malley, 1916; Wilson, 1958). In Ujankhalsi there exists a *samaj* system as well. A senior member of the leading *bongsho* or *goshthi* heads each *samaj*. They resolve disputes among members. The post of *pradhan* (headman) and *pramanik* (sub-headman) of *samaj* are hereditary, from father to son. Sometimes resourceful persons gain position and are succeeded by subsequent generations. Sometimes poor individuals lose the title, if they are unable to maintain the formalities of the *samaj* as a *pradhan* or *pramanik* and from then on they are prevented from passing on this post to their successors. they may regain the position again if they become ssuccessful and recover from their failure. Although not formally recognised by the government, headmen perform important religious, ceremonial and economic functions and guard norms and values within the village.

In Ujankhalsi, the members of the *samaj* are hierarchically related. They exercise power within their territory. Each *samaj* comprises one *pradhan,* the headman, two or

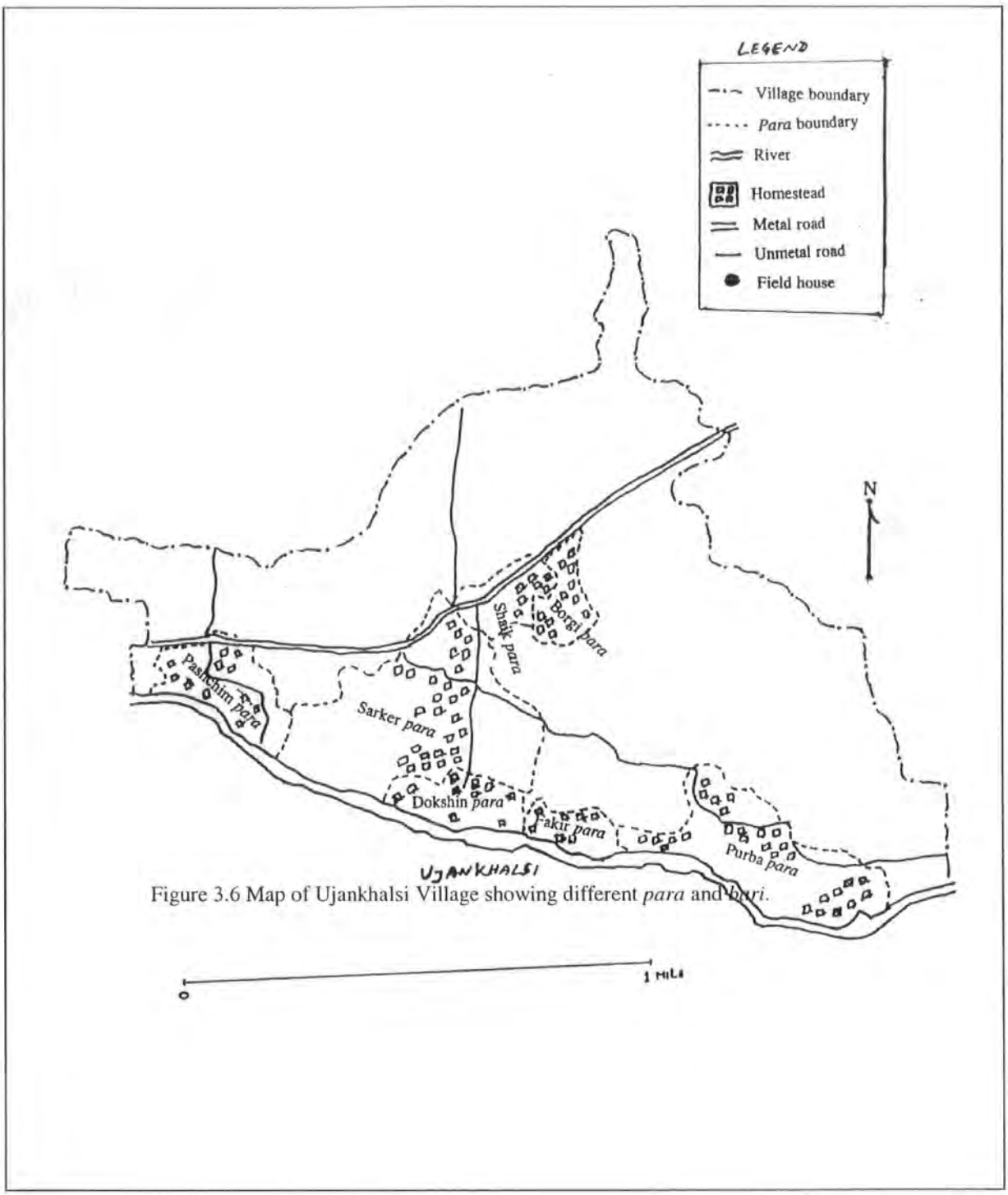

Figure 3.6 Map of Ujankhalsi Village showing different *para* and *bari*.

more *pramaniks,* sub-headmen, and the *chutkels,* members of the *samaj.* There is little difference between *pradhan* and *pramanik.* The village of Ujankhalsi, is divided into ten *samaj,* headed by 36 *pradhan* and *pramanik.* Together they comprise the village or *gram samaj.* One *pradhan*, Jabbar heads the *gram samaj.* Most disputes come first to the *samaj.* If they cannot be settled, they pass to the *gram samaj.* If the dispute is between the members of two or different *samaj*, the *pradhan* of the respective *samaj* first sit together to negotiate a settlement or refer it to the *gram samaj.* Village-wide events (ceremonies, functions or voting in elections) also come under the *gram samaj* jurisdiction. While two factors commonly determine *samaj* composition - kinship and territorial proximity, another, the 'political view', also contributes to the *samaj* identity (Karim, 1990). In social context, it has great significance as they are maintaining their social integrity, which is a prerequisite to social development. They also help villagers to some extent to manage their resources reliably.

3.4.1 The *Pradhan*

The positions of *pradhan* and *pramanik* are hereditary. The line of succession is normally patrilineal, passing from the father to the eldest son. Sometimes the eldest son is unsuitable (illness, uneducated, etc.), then it is transfered to the next eldest son. If the successor is unsuitable or dies, and has no alternative relative for the post, members may select their *pradhan from persons of suitable social standing.*

Jabbar is the present *gram pradhan.* Sobahan, father of Jalil and Jabbar, was the previous *pradhan* of this village. Jabbar inherited the position instead of his elder brother, Jalil. This is because Jalil was not educated and so was less acceptable to the villagers. Moreover, after marriage he had separated his homestead from that of his

father. Considering all these circumstances, his father was not interested to see him (Jalil) as his successor. Moreover, Jabbar is more educated (a graduate), and more articulate. He is an influential man, holding several posts in different committees and being a link-man with other villages and government officials.

The Sarker *goshthi* is the largest and most influential in the village and has held power here since their early settlement. Nasir and Sobahan, former *gram pradhan* were also the Chairman of the Union *Parishad* (UP)[8]. The previous Chairman, Monsur, is a nephew sister's son) of Sobahan, so considerable power remained within the grasp of sarker *goshthi.*

3.4.2 *Samaj* and Power

The *pradhan* and *pramanik* are responsible for initiating and conducting meetings and settling disputes among *samaj* members. There are no written rules for conducting these affairs. When people face a problem, they go to the *pradhan* of the respective *samaj* for help or justice. When the *pradhan* thinks it is necessary, he calls a *sobha* (meeting) of *samaj* members where they discuss the matter and try to solve it. If it can not be settled, they pass it on to the *gram samaj.* If it is a village wide event, it comes under the *gram samaj*'s jurisdiction. How this traditional power base influence farmers' cropping decisions will be discussed in Chapter 8 (see section 8.5.3).

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[8] Union Parishad is the smallest local government unit in Bangaldesh. Its average area is about 12 sq.km The Chairman (head) and members (sub-ordinate to the chairman) are the people's representative in this organisation and are elected by ballot. Ujankhalsi remains in the Union 'Kismatgankair'.

The *pradhan* and *pramanik* are the informal representatives of the villagers and maintain links with government, non-government officials and political leaders at local and nationals. They are usually aware of any development works to be undertaken locally. Sometimes they actively participate with these schemes and, as a result, they and their supporters get access to inputs and other facilities, which impact on the local resources management. These political leaders also maintain links with these local leaders to maintain their activities and seek help during elections. Otherwise, it would be difficult to get votes for their respective candidates in the election (Wood, 1976; Karim, 1990).

Sometimes conflicting situations centre on the role of the leader and members with economic, kinship or patron-client ties or with a combination of any of these. These conflicts may serve as instruments for individuals to further their personal interests. The results impact on gaining or losing resources in rural Bangladesh. Chapter 4 (see section 4.5.5) discusses how this political patronage impacts on obtaining access to land in Ujankhalsi village.

3.4.3 Local Government and Non-governmental Organisations

The *Thana* (Police Station) is at Durgapur, but has little involvement in village life, as disputes are usually settled by the villagers. There are other governmental offices such as the Agricultural Office, Fishery Office, etc. which remain at *Thana* level and people depend on those offices for land registration, agricultural extension, health and sanitation advice, tube-well assistance, etc. There is an Agricultural Block Supervisor's (agricultural extension worker) residence-cum-office in the village. He provides some assistance with experimental plots, seeds, advice on crop management, etc.

Along with these government offices there are some non-governmental organisations (NGO) that are actively engaged in some development work in this village. Among these NGOs, BRAC (Bangladesh Rural Advancement Committee), ASA (Association of Social Advancement), Green Bank, CARITAS are prominent. They are trying to empower poor village women by lending them money for various enterprises such as poultry keeping, homestead construction and cattle management. They are also trying to make poor women aware of their rights. How these organisations influence the village's agricultural system will be discussed in Chapter 8 (see section, 8.4.4).

3.5 CONCLUSION

Having a subtropical climate and heavy seasonal rainfall in the area, agriculture is seasonal. Flooding occurs every year and it is one of the major determining factors in agricultural practices. For basic subsistence, people need to grow crops on their land the year round and they have to maximise their products by wisely managing the land in the face of this natural constraint.

The household is the basic unit of consumption and decision making process. The composition of household and its economic position is important for managing their resources. People also get access to resources in different ways. Kinship and other social relations are important aspects for gaining access to resources. By resolving disputes between villagers and organising community activities, the local political structure, the *samaj*, helps to maintain the independence and the identity of the village and its locality. They also have an important say in how external matters influence village life.

The main purpose of this discussion was to explore how households or other social units involved in village life in Bangladesh as represented by Ujankhalsi. So it is essential to know how the different ecological, social and political factors interact with one another and how people from different socio-economic categories live together and yet attain different goals for their livelihood by exploiting these factors. It is necessary to understand these relationships when seeking to interpret the local decision making process.

4. ACCESS TO LAND

4.1 INTRODUCTION

Land is a vital resource in an agrarian society such as Bangladesh. Land possession not only determines one's economic status but also one's social standing and political power in society. In the long-term, increase or decrease of land holding is an aspect of the owner's identity, which determines how he / she would be regarded in the community.

In Bangladesh, almost 80 per cent of land is in private ownership. By law, the owner has the right to use or to transfer the land to others. The division of landholdings is in accordance with the laws of inheritance in Bangladesh. The continuous reduction in the size of holdings, where the population is growing at a rate of 2.17 per cent per annum, is instrumental in some cases, especially where there are many children, of landholding becoming insufficient to support families. Landholding also changes as a result of purchase / sale, mortgages, etc. Due to these factors, some can gain or lose their land rights. Therefore, it is crucial to understand how rural people gain access to land, because agricultural decision-making process fully depends on the nature of access to this resource. This chapter aims to explore how floodplain dwellers gain access to land and how they are making cropping decisions facing the prevailing opportunities constraints.

To attain its aim, this chapter discusses the land reform system and its impact on people; the laws of inheritance and its impact on people; how land market operates in rural areas and the nature of sharecropping system prevails in locality, etc. Finally it discusses the complex relationship between rural people and how it determines agricultural decisions.

4.2 LAND REFORM SYSTEM IN BANGLADESH

This section deals with the history of land reform in Bangladesh and shows how those reforms have impacted on rural livelihood. In Bangladesh private ownership of land has existed for centuries, the peasants enjoying freedom of cultivating that land. Mukherjee (1957) holds that peasant had joint ownership of land with the state before the Colonial period and private ownership followed it. Before the British rule (i.e. before 1757), neither the State nor the *zamindar* owned land. Peasants had the traditional right to till the soil and the state held the right to collect taxes through *zamindars*, the intermediaries of the Mughal Empire (Calkins, 1976; Tepper, 1976).

The British colonial government in 1793 wanted to bring about agrarian transformation in Bengal through the 'Permanent Settlement Act', in the fashion of property laws in England. Through this Act the *zamindars* became the owners of the land and the farmers became their tenants. It ignored the land rights of the peasant and provided proprietary rights to the *zamindars* in return of a guarantee of a fixed revenue. The peasants' right was transferable and inheritable. So from this time land becomes a commodity to sell, and so it started to concentrate in the hands of a few people. It was expected that the new landlord would behave like the landlords of England. Unfortunately, this was not realised, as they became absentee landlords, instead of

agricultural entrepreneurs, and created a number of intermediaries - in some places as many as fifty- each of whom subleased the land and took a share of the rent (Mukherjee, 1933; Abdullah, 1976). After a few years, agricultural production stagnated and the peasants fell into debt. Many previous land-owning families, at that time, became landless or marginal farmers. Several attempts were made to correct the inequalities e.g. 'the Rent Act' of 1859, the Tenancy Amendment Act, of 1926, the 'Money Lending Act' of 1933, 'Rent Regulation Act' of 1938 (Act no 6), but the condition of tenants failed to improve.

Colonial India was partitioned in 1947 into the states of India and Pakistan, the latter comprised two wings - East and West Pakistan. An important land reform measure adopted by the then Pakistani government was the abolition of the *zamindari* system within East Pakistan (former East Bengal, now Bangladesh) through the 'East Bengal Estate Acquisition and Tenancy Act' of 1952. By this Act, the *zamindari* system and various systems of sub-feudalism were abolished and ownership of land was fixed up to maximum 100 *bighas* (33.3 acres) per household. This reform faced considerable opposition from the landed aristocrats, who supported and some cases had taken part in the previous anti British movement and lobbied for an increase in the land ceiling, which was subsequently raised to 125 acres (Rahman, 1986). In East Bengal, many *zamindars* were Hindu who left East Pakistan after partition. A vacuum in land ownership occurred with the abolition of *zamindari* system. The '*jotedar*', who were the intermediaries of *zamindars*, now emerged. The result of this reform was the raising up of rural power brokers who succeeded in taking over control of much of the land (Boyce, 1987).

After Independence from Pakistan in 1972, the new government of Bangladesh reviewed these problems, legislating that no family should own more than 100 standard *bighas* (33.3 acres) of land. Co-operative farms and commercial plantations were exempt. The '*khas*' land that belonged to the government was to be distributed among landless peasants and marginal farmers, who had no more than 1.5 acres of land. However, only 0.2 per cent of cultivated land was acquired and only a total 0.6 per cent of government land was distributed among poor peasants (Dutta, 1998). This measure proved inefficient and in 1975, the government reduced the land ownership limit to 75 *bighas* (25 acres) per family, and sought to establish a system of compulsory co-operatives. The produce of co-operative was to be distributed in thirds - one-third to the landowner, one-third to the labourers and one-third to the owners of capital (ploughs, bullocks, seeds, fertiliser, irrigation water, etc.). However, the President at that time was killed in a coup in August 1975, and this policy was never implemented.

In 1979, a cabinet committee was set up to make recommendations for new land reforms, but failed. In 1982, another Land Reform Committee was set up, which submitted its report in 1983 which was the basis of 'The Land Reform Ordinance 1984'. This law declared a land ownership ceiling of 30 *bighas* (10 acres) in flood-free areas and 60 *bighas* (20 acres) in flood prone areas per family. The State would acquire a family's excess land on payment of compensation and a *borgader* (sharecropper) would be entitled to cultivate up to 15 standard *bighas* of such land. The ordinance also recommended some tenure reforms such as security of tenure for sharecroppers of a minimum period of five years (Rahman, 1986; Khan and Ali, 1985). The law has yet to be implemented fully.

We can see that from 1793 until recent times several land reforms have been recommended which put different ceilings on land holdings. These measures have achieved little. The landed aristocrats in rural areas are very concerned about their landholdings and are often able to keep their landholding intact. They register their land in the names very close relatives (*benam*), who have less land and will not claim ownership. For examples,

> Amir, a rich farmer, has more than 105 *bighas* (35 acres) but he told me about only 47 *bighas* (15.66 acres) of it. Another family head, Chowdhury, who lives with his mother, has more than 300 *bighas* (100 acres), but showed me papers for seven households consisting of five brothers, one sister and his mother, claiming that each has 25 *bighas* (8.3 acres) of land. Actually all the members and land belong to the same household. Four brothers and one sister live in urban areas and when they visit, they stay in the same household and take meals there. Moreover, all harvested crops go into the same granary. The rest of their land is in the name of other relatives.

Sometimes, the government acquires some land for redistribution due to the ceiling and distributes it among poorer households. But only rarely do these people gain possession. Even when the government helps them to take possession, with court orders or police, the previous owner evicts the later from those possessions. Sometimes these poorer households face civil court cases, which continue for a long time and are expensive. Often they have to drop the case and lose possession of the land. Most often this redistribution system creates conflicts among farm families, which, indirectly, prove harmful for the poorer families who fail to get other support from related wealthier families. For example,

> Rahim, a poor farmer, once cultivated one plot as a sharecropper from Chand, a rich farmer. He got the possession of that land under this redistribution system. Later he was evicted from the land by Chand and, ultimately, lost the sharecropping facilities of any land from him and his relatives.

In reality this redistribution system fails to give security to poorer farmers. The problems of land distribution in Bangladesh are so complex that even if the reform is fully implemented, it can only touch on the problem rather than solve it. No doubt it influences cropping practices of farmers. If we examine the above two examples, we can see, in practice that Chowdhury is an absentee landlord. He has given all his land to sharecroppers instead of cultivating it himself. Normally he does make his crop plan, most of the cases his tenants make these. In the case of Rahim, the scenario was different. Being a poor farmer, with very limited land, he was dependent on his landlord. Before the conflict, they took cropping decisions mutually. However, when Rahim was evicted from the land, he had lost the opportunity to grow crops there and Chand had to take new measures in order to grow crop there, and ultimately, both have to make new suitable decisions for growing crops. So the land reform system influences people's cropping decisions.

4.3 LAW OF INHERITANCE

This section discusses the basic rules of the inheritance system applicable to land property, by which people gain access to land and it demonstrates how local people bypass these laws in order to retain their ownership for themselves. Finally it describes how this influences the farmers' decision-making process.

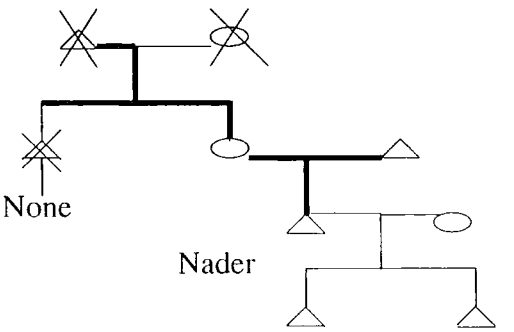
Inheritance system is the principal way that people can gain access to land in Bangladesh. The village of Ujankhalsi is comprised of Muslim families, so here the Muslim law of inheritance applies. According to this law, all sons inherit an equal share of land and a daughter inherits half that of her brothers. A Muslim woman is an heir to the property of her father, mother, husband, son and daughter. When her

husband dies, the widow should inherit one-eighth of his property, and if he dies childless, she should inherit one-fourth. The remaining property will be passed on to the husband's closest relatives (Jansen, 1987). If a couple has no son, a daughter alone cannot inherit all of her parents' property; a part goes to her father's brother's sons. If the son dies before his father, the grandsons and granddaughters do not have the right to inherit any property. According to these rules, the property of a man with a wife and three daughters and three sons, should be divided into seven unequal parts at his death.

The situation can become complex, depending on family histories, and female rights sometimes come to dominate. For example,

> Nader, a medium farmer in Ujankhalsi village, inherited most of his land from his maternal side. His father, Asif had been living in his in-law's house as *ghor-jamai*. He (Asif) had one brother-in-law who had no child or other inheritor. All of his father-in-law's land passed to him and Nader in turn inherited it (Figure 4.1).

Figure 4.1 Land inheritance in the Nader family.



Note: ——— = Transmission of land, ╳ = Deceased.

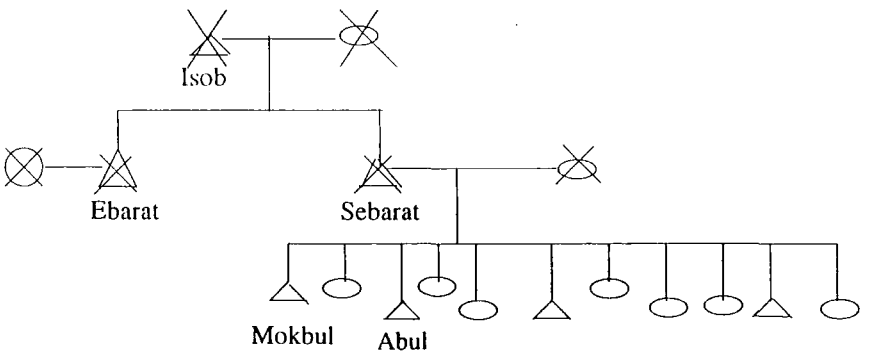
The villagers of Ujankhalsi trace their relations in the patrilineal line and practice patrilocal residence. But maternal affinal ties are sometimes important for determining the position and status of a family. Out-marrying daughters, and their husbands, often enjoy a privileged position in the households of their in-laws. The reasons for this are that out-marrying girls are, theoretically, entitled to inherit a share in their parents' property. In many cases, the daughter either does not claim her share or is deprived of it. The girl wants to maintain good relations with the members of her natal family, especially with her brothers and she rarely claims her share. This acts as an assurance for her in case of divorce or widowhood. If she is married into a family that is well-to-do, her future might be assured but in many cases women have problems with their husbands (suffering reproaches or having to do menial tasks). An option for her is to return to her natal family. If her ties are strong and the relationship good, her brothers will welcome her home to live with them. If the situation is reverse (if she has taken her share of land), her brothers might not welcome her or take good care of her. It is understandable that women normally do not take their share of land but invest it in their future security.

In Ujankhalsi, I heard of several cases where husbands pressed their wives to take land from their brothers or claim a substantial compensation for their share of land (Box 4.1). When I discussed this matter with both parties it was told that the brothers were not ready to give shares from each plot, they were biding time and hoping that they would bring their sisters and their brother-in-laws in their point of view. The brothers-in-laws remained determined to take their expected share before the next *boro* season.

Box 4.1

Isob had two sons, Ebarat and Sebarat. Ebarat had no child but Sebarat had four sons and seven daughters (Figure 4.2). Sebarat married off all his daughters before his death. He had 27 *bighas* and 10 *katha* (9.14 acres) of land in 52 plots. As Ebarat had no child, he had given all his land to Sebarat's son by a 'will' and this land is not inheritable by Sebarat's daughters. After his death, the sons separated, formed 4 new households and they divided up their land holdings too. They did this with a formal deed, '*batoara* registry' (a registered document regarding the type and amount of shares), in which they distributed their father's land among themselves and their sisters according to the law i.e. 3.65 acres for the sisters and 5.48 acres for the brothers. But the sisters did not take any land from their brothers at that time. They said "when have enough money give a payment to your brother-in-laws". This was because, they were sorry at their father's death a few months ago and their brothers were separating and, also, to ensure their privileged position in their brothers' houses. Later their husbands insisted on them taking their share of land from their brothers and after three years, the sisters claimed their shares. Their elder brother said "if you take your land-shares, we will not be able to feed our children, rather take money from us instead of land". But their husbands did not agree with this and pressed their wives again to claim their land. So the brothers allocated 1 *bigha* to each sister in selected plots. Now the sisters' husbands came forward and claimed that these were not proper shares, and that, the land was not good enough in comparison to other plots. They were adamant that their wives had to receive shares from each plot. The brothers negotiated with them and tried to explain that if they took a share from all plots, some plots would not be profitable for cultivation. In a summer of 1999, the sisters' husbands became more organised and demanded their land after the *boro* crop (dry season crops) but their brothers were determined not to divide up all their plots and were used 'delaying tactics'. They left these given plots for their sisters, even though they did not cultivate any crops on these plots which they gave to their sisters during next *aus* season (monsoon season).

Figure 4.2 Land inheritance of Sebarat's family



In this conflict of interest the sisters are in danger. There is no way out of this situation. On the one hand they do not want to offend their brothers but the other hand, they are in a precarious position with their husbands if they do not take their proper share.

Another common deviation from formal Islamic inheritance law is that the widow seldom claims her one-eighth of the property. When land is divided after the death of her husband, her sons and *goshthi* elders or *pradhans* allocate some land for her food and, normally, she will live with one of her sons. He will cultivate this land and make decision concerning its use. If she belongs to a poor family, only a small plot will be allocated to her, which will be insufficient for her subsistence. If she belongs to a wealthier household, a large area of land will be allocated for her, which is enough for her, and in such a case many of her sons may be eager to have her live with them. When she dies, her land will be distributed among her sons.

There are several ways in which the inheritance rules can be legally bypassed. When a man wants to make sure that his favourite heirs or other persons will have some of his land, he can make an official will. An adopted son, wife or a favourite son or daughter or any other person can obtain land in such a way. If the father and sons have a strong will to keep the land within the lineage, the father can also register all the land in the name of his son and, thereby, prevent his daughter from taking land out of his lineage when she marries. Sometimes self-seeking sons, or heirs, can take land by forcing their fathers (ancestors) to register some of his land in their name. For example,

> Amir, one of the rich men in the village who is the only son of his parents, has three sisters. Amir has taken[1] all land from his father in the form of 'sale

[1] I heard from the informant that Amir pressed his father to give all his land to him (Amir).

registry[2]'. His father gave him this because he did not want to quarrel with his son with whom he lived during his old-age which was his security and, also, he did not want to pass his land on to another family or lineage such as his daughters' families.

Practically laws of inheritance and land distribution through this system, is very complex and a number of social issues are involved which are significance for this study. There are several examples in this village such Amir, Chowdhury or Sebarat / Ebarat's families. If they distribute their land to their heirs properly, they would become medium or poorer families and, also, due to division of land holdings some land may no longer be suitable for growing specific crops or may become economically less profitable. By passing the legal system, these families remain better off than they would be if the land is to be transferred legally. By retaining intact a larger portion of land, their crop choice will be different from those of poorer families. If we look at the families of Sebarat's sons who were wealthier when they were united. After separation, they tried hard to improve their economic position. At that time they were not interested in giving a share to their sisters from all their plots. This was because they had some good plots and if they had to divide them, they would become unsuitable for certain crops. As this could affect their livelihood strategies badly and so they were taking time to bring about the situation in their favour.

[2] 'Sale registry' means an official registered document where the previous landholder has sold his land to the present holder, generally for money. If any ancestor sold his land to others, his offspring could not demand their share even if the present holder is their brother or sister.
In Ujankhalsi, sale registry is common where father wants to give his land to his favourite son or daughter. Officially, this transaction should be for money and so is taxed by the government according to the amount of money paid. On paper, they use to cite the amount of its recent valuation, however, usually no money transactions takes place.

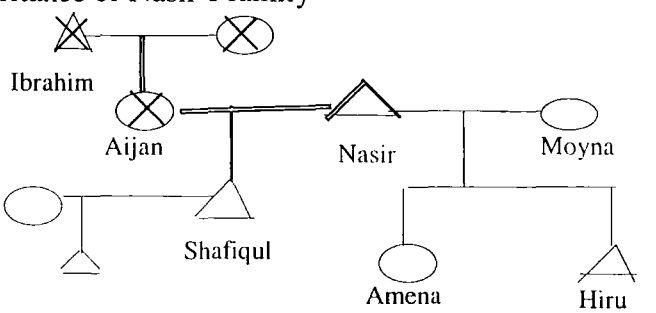
If we look at the other side of the coin, we can see some farm families did not get legal shares from their close relatives. If they got access to their expected share, they will have more land, be better off than their present situation and their cropping decisions would differ. There are several stories of fathers favouring one son in favour of another. For example (Box 4.2),

Box 4.2

Nasir, a rich farmer in his 60s favoured his younger son. Nasir had 4 *bighas* of land when his father died. He married the only daughter of Ibrahim, who was a rich man and inheriting about 24 *bighas* (8 acres) through his wife. She had one son, Shafiqul, who is a government employee. When Shafiqul's mother died, Nasir married again and his second wife had no land. He had one son, Hiru, and one daughter, Amena (Figure 4.3).

According to the rules of inheritance, Shafiqul should inherit of all of Nasir's first wife's land except for the one-fourth share going to his father plus his parental 4 *bighas*. Hiru and Amena are only entitled a share of Nasir's land. However, Nasir tried to get round this by selling his first wife's land and purchasing new land in his or Shafiqul's name, or jointly with Shafiqul. Both of his sons and the daughter can legally inherit of this newly purchased land. At one point, Shafiqul realised what his father was doing and he refused to agree to sell any more land. Hiru went to University and needed money to subsist there. Earlier Shafiqul had provided for his expenses. Then he stopped giving any money to Hiru. He stopped to supporting the family and moved to another house. During the period of land sharing, again conflict arose. Nasir kept the one-fourth of his first wife's land, over which he has legal right for his consumption and shared the newly purchased land to Shafiqul according to the share. The rest land remains in his name and Hiru and Amena live with him.

Figure 4.3 Land inheritance of Nasir's family



Here the situation becomes complicated. If we consider the crop management practices before this incident, Nasir had made all cropping decisions for his family. He had an understanding about sharecropping system and also knew where to do what on his own

farm. When his family disintegrated, he had to rearrange his all arrangements. Now he has limited land and has had to arrange his crop planning within this limitation. On the other hand, Shafiqul, as a service holder, has limited practical knowledge about his land and suitability of crops to grow on it. Moreover, he has not enough time to look after his crops, so he mainly depends on his sharecroppers. So his crop planning is different from that of his father.

This section has described the competition for gaining land, which take places between close relatives. Many people said that it was painful when enmity, suspicion and hatred develop between brothers due to attempts to gain land. Thus, this inheritance system is a crucial factor in preventing the family developing and pursuing major interests on a corporate basis. It, also, has an impact on the pattern of resource mobility (particularly land resource) in the rural households and ultimately, influences farmers' decision-making process.

4.4 RURAL LAND MARKET

Here the land market refers to the act of buying, selling and mortgaging of land. This section discusses how people from different groups, in different ways, participate in land market to gain access to land and explores how these influence farmers' decision-making process.

4.4.1 Land Selling or Buying

The nature of the rural land market cannot be understood in isolation from other markets for produce, labour, credit, etc. because farmers are intricately associated with these factors. Poor peasants only sell land after long a consideration. It is an agonising

decision. They try their best to cling to their land through various strategies, such as curtailing consumption, seeking off-farm employment, accumulating debt, seeking mortgaging, etc. When these strategies fail, they have to sell land. First they sell small areas of less productive land which is difficult to manage. Wealthier farmers may also sell some lands to manage some difficult situation but only a small part of their holdings. They also sell land for asset transformation, economic diversification, etc. During the period of my fieldwork, I recorded the following formal land transactions by the villagers.

Table 4.1. Selling and buying of land by different groups of farmers in Ujankhalsi village between May 1997 and July 1999.

Item	Rich farmer	Medium farmer	Small farmer	Poor farmer	Total
Sale	3	4	8	6	21
Buy	2	14	4	8	28

From the Table 4.1 we see that three rich farmers sold land. One to pay for his son's education costs studying at University, another to expand his pharmacy business and the other to purchase land on which to construct a new house. Two rich farmers bought land whereas some rich farmers have the ability to buy land but they do not always wish to do so. The problem for the wealthy is that they do not have sufficient labour to manage all of it and according to them, agriculture, at the present time, is not profitable with hired labour. Four medium sized farmers sold some land for a variety of purposes. Several poor farmers sold land when all other means of retaining it failed. There remains an opportunity for women from poorer families to get loans from several non-governmental organisations (NGOs) which provide loans to them to set-up income generating activities. They also tried to use some of the money, obtained from these organisations, in order to buy land. Some of them also have other sources for

subsistence. Comparatively more small farmers sold land, this is because they are in difficult situation. They have not enough land to subsist, they are not entitled to get loan from all NGOs[3], and they are reluctant to work as wage labourers. In this situation, they first try to cope with the distress condition by several means before deciding to sell land. This group of farmers are in precarious situation.

It is important to know how farmers finance for the purchasing of land because this allows us to understand the associated factors related to the land market in the rural areas. I observed three types of finance for purchasing land.

(1) Agricultural sources: Finance from the marketing of agricultural produce. It may or may not comprise a surplus. Sometimes farmers sell what they would normally consume in order to buy land. After buying the land, they reduce family consumption, borrow money, seeking alternative sources of income and lease out land to others, if necessary. This has an impact on crop planning. Normally farmers make decisions to grow more cash crops such as onion, banana, papaya or chilli when they plan to buy land or after they have bought it.

(2) Non-agricultural sources: Income from non-agricultural resources refers to money earned from jobs, business, foreign earnings, etc. Foreign earnings are important sources for buying land in rural Bangladesh as mentioned by several authors (Ullah, 1996; Chowdhury, 1998; Dutta, 1998).

[3] There are some NGOs, like BRAC, Grameen bank not provide loan to those who have land more than 2 *bigha*.

(3) A variety of sources: this refers to a combination of the above mentioned sources. In fact it is difficult to identify exactly these types of income. In most cases, farmers bought land with a combination of their agricultural income, by borrowing money from other relatives, friends, institutions and from business or jobs.

There are several reasons why villagers have to sell their land. As There is a tendency among the people of this village to cling to their land, the selling of land can be viewed as the survival strategy for these households. As far as I could document the reasons for selling land are:

(1) Distress sale: Sometimes households face a severe imbalance between income and expenditure. This may be due to crop losses, natural disaster, debt obligations, illness, expenditure on marriage or rituals (funeral ceremonies, etc.). When poor peasants have no alternative but to raise money quickly they have to dispose of their only valuable asset, land. Sometimes poorer families have to sell land for their daughters' dowries (see Chapter 3).

(2) Asset transformation: Villagers sometimes sell land in order to buy transport vehicles, irrigation pump sets, plough-cattle, etc. It may not change the wealth of a household initially, but it may have an impact on household wealth in the long term. It may be viewed as the readjustment in household wealth by substituting less secure wealth for potentially more secure wealth (Ullah, 1996).

(3) Diversification of economic activities: Villagers also sell land to diversify their economic activities such as to start a business, or provide a bribe to get job. The net outcome of these activities, depend on their success.

4.4.1.1 Relationship Between Seller and Buyer

There is an informal rule in the rural areas that land should be sold to the nearest shareholder in term of family relationship (*shariq).* This is to keep land in the same lineage group. If the *shariq* is not willing or cannot buy one can sell land to others. Sometimes, relatives discourage a person from selling land outside the lineage even if there is a prospective buyer. However, not all villagers follow this rule. Some of them sell their land where they can get a higher price.

Most often the sellers get less money when they sell to relatives. Poor farmers do not want to lose money by this and they often hide their intention to sell from relatives. This creates enmity between relatives when they find out that the new owner of their *shariq* is an outsider. Sometimes, it happens that a poorer has good relationship with a wealthier farmer and so gets support from him when necessary. In that case he (the poorer) does not hide from him (the wealthier) that he intends to sell a piece of land. If he borrows money from a wealthier farmer but cannot pay it back, at that time the wealthier farmer may press him to sell land to him and the poorer farmer has no option but to sell land to him at a considerable lower price than the market one.

To sell land is shameful for rich and medium farmers. They are not interested in selling to outsiders. If they have to, they try to sell land to their close relatives. There are some people who act as middleman *(dalal),* as they have good knowledge of the land market. They maintain good relationships with sellers and buyers. When one intends to buy land, he informs a *dalal* who provides information about potential sellers.

Since the introduction of irrigation facilities in the dry season, farmers are able to grow lucrative cash crops such as onion, banana, papaya, chilli, etc. Due to this the demand for land to buy is acute. On the other hand, farmers are not interested in selling any land unless they have a serious problem. Instead of selling land, they prefer to mortgage it to deal with a problem. In the next section, the extent and impact of this mortgaging system will be explored.

4.4.2 Mortgaging

This section describes different forms of mortgaging system and relates those with farmers' decision-making processes. There are two forms of mortgage in Ujankhalsi: one is locally called *kotbondoki*, or simply *kot* or *bondok* (herein after as *kot*) and the other is *khaikhalas or* locally known as *lease* (herein after as *lease*). In *kot*, the land remains under the control of the moneylender until the loan is paid back to him. Under *khaikhalasi*, the land leased out reverts to the landlord after an agreed period of time. In fact *kot* system is disadvantageous to the landowner as it may remain for up to unknown period to *kot* holders.

It is an important and common aspect of accessing to land in Ujankhalsi village. When a landowner mortgages his / her land to someone, he / she loses the control over the land. The person accepting the land as collateral cultivates it himself, or he may rent it out but he cannot sell it or do any irreparable damage to it. During a crisis, land mortgaging is one of the easiest way to obtain money. The terms are negotiated and must be agreed on by both parties. In most cases the land is mortgaged on the basis of a mutual oral agreement between the two parties, though occasionally it is written down. The agreement is made in the presence of the *pradhan* or *pramanik* or kinsman of both

parties. Although it depends on the agreed terms and conditions, the mortgagee usually can take at least one crop. At the time of the agreement, if there is any crop on the plot, the *kot* acceptor will act as landowner and the mortgagor as sharecropper. Karim (1990) observes similar situation in case of Gopalhati and Dhononjoypara villages of Rajshahi district.

4.4.2.1 *Lease (Khaikhalasi)*

The land, which is suitable for highly valued crops (banana, papaya, chilli, onion, HYV paddy, etc.), has a high mortgage value. Normally, mortgagors lease these lands for a higher price. The arrangement depends on the economic position of the landholder and his social and bargaining position. Rich people, without exception, give their land for *lease* when necessary, and rarely enter any *kot* arrangement.

In Ujankhalsi, a family with large holding cannot usually meet the labour demand of double or triple cropping cycle using existing techniques of cultivation. In fact, the interaction of crops, seasons and techniques of production creates a seasonal labour shortage. There are some crops, like onion, HYV paddy, banana, papaya, etc. which demands a steady supply of labour, especially for weeding and irrigation. Day labourers are regarded as unreliable by rich farmers for their 'deceptive attitude', and need constant supervision. Under these circumstances, they prefer to *lease* their land when they have land but little manpower. Nowadays, the return from sharecropping, for rich farmers, is less than for mortgaging the land. Although this type of mortgaging is restricted to high value land, there are other types of land, which they to give over to sharecroppers. However, it now appears that they are switching their policy from sharecropping to mortgaging to fit the increasing demand of this *lease* system.

> Kena, a rich farmer, thinks that he has insufficient labour to manage all his land. According to him, the return from sharecropping is not as profitable, as from the *lease* system. Sharecroppers sometimes do not give a fair share. So he has leased out some land. Alam accepted a *lease* from Kena. Alam has taken one 3 *bigha* plot for 30,000 *taka* for three years. The first year he cultivated potato in the winter and got 300 *monds* (1 *mond* = 40 kg). He could not afford to put these potatoes into cold storage and so sold them immediately after the harvest. This reduced his profit. After potato, he planted bananas and the production was good and Alam was hoping that it would cover all his costs (including *leasee* money) and so next year's production will be in profit.

In this case the cropping decision of Alam varied from that of Kena. This is because Kena has insufficient labour to manage a labour intensive crop. So he had to plant less labour demanding crops, because labour intensive crops are economically less profitable to him. On the other hand, Alam has sufficient labour in relation to his land and though he paid lot money for this plot, he hoped to earn more money within a limited time by growing cash crops such as potatoes and bananas. So cropping decisions vary with the nature of access to land and personal choices.

4.4.2.2 *Kot* (*Kotbondoki*)

As it was observed that most *kotbondoki* (mortgagors) occurs among poor and medium farmers. The *kot* acceptors are also poor and medium farmers. This *kot* system is more frequently used during the *boro* cropping period or in lean periods. In *boro* season farmers cultivate onion and HYV paddy, which demand high inputs (fertilisers, insecticides, etc.). Sometimes they fail to arrange money to buy sufficient inputs from expected sources. Then they may decide to give land in *kot*. In lean periods (a flood period or just after flood period i.e. August to mid November), farmers have few ways of earning money and, poor farmers may fall into crisis. They may need money immediately to save their crops or to subsist and, ultimately, they enter into a *kot* arrangement.

When farmers make a decision to give a land for *lease* or *kot*, they approach several potential leasees and then they negotiate with the person who offers the highest price. They also consider the potential behaviour of the leasee. Sometimes farmers approach their relatives and neighbouring plot holders to take the land as *kot*.

Landowners who intend to give a land *kot*, seek suitable holders from whom they can get not only the best terms, but expect to receive other kinds of benefit as well. If a landholder can cultivate the *kot*-land as a sharecropper it is to his advantage, as he may feel that he still has some connection with the land. Nazim, a small farmer, wanted to lease one plot as *kot*. This is because he was facing difficulties in purchasing fertilisers and insecticides. There was HYV *boro* paddy on the plot at that time. He requested Aleya, our cook, to take this land as *kot*. When I asked the reason for choosing her as an acceptor, he said,

> "Aleya is a woman and she would not cultivate the land. I could ask her to cultivate this as a sharecropper. Moreover, she has no cattle but I have 5. I need straw for those cattle. If she takes this land as a *kot*, she would not claim for the straw and I could take the whole straw from her. For that reason I requested her to take the *kot*."

Here as a sharecropper, the landlord has comparatively more freedom to choose the crops because present mortgagee, being a woman is thought to lack of knowledge about the suitable field crops. So she has to rely largely on her sharecropper.

Sometimes *kot* acceptors prefer to give more money than the actual *kot*-value. The reason for this is the that landowner may not be able or willing to repay the money. In this case, the *kot* acceptors could demand ownership of the plot by paying the rest of the money owing. Atiq, a medium farmer, had given 10,000 *taka* for a 10 *katha* plot to

Ahamed and take over the control of that land. Ahamed expanded his grocery shop with this money but the amount was higher than expected. when I discussed this with Atiq, He said,

> "I am ready to give more money for this plot. The plot is near my plot where I have a *pipe* (irrigation facility by STW) and I think it would be difficult for him to pay back this money soon or he may need more because his business is not going well. Therefore, he might have to sell the plot in few a years and I would like to take the chance to buy it."

In this case acceptor's intention was to buy the land in near future. Moreover, he had irrigation facilities near this plot. So he has the opportunity to choose suitable crops in dry season. For that reason he offered more money.

As in the *lease* system, the land reverts back to the landowner after an agreed period, therefore, its impact on farmers is not severe. The farmer knows when he will get back his land. However, in the *kot* system, in many cases, the consequences are harmful to the landowner. These landowners usually have a deficit budget, so it is difficult for them to save money and, consequently, they have to wait a longer period to get back the land.

Some farmers are desperate to get their land back. In order to do so, either they select special cash crops for the rest of their land or sell a piece of land or have to obtain money with high interest rate from a moneylender. The latter may push them into a debt cycle, which can prove disastrous for these landowners. I also found in this village that land owners who gave some of their land for *kot*, select cash crops such as onion and banana for cultivation to earn sufficient cash in time to clear their dents.

> Jeher, a small farmer, gave 4 plots in a *kot* arrangement extending over five years to three farmers when his son, Sadi, started his tailoring business. In 1999, he cultivated onions on some of his plots where he used to grow HYV paddy for subsistence. He knew that he would have a shortage of rice after a few months but he was desperate to clear his debt. His wife had also obtained a loan from ASA, an NGO for poultry keeping purpose, so together they paid the *kot* money back.

How does this mortgaging system relate to cropping decisions? Those who have no or little land to cultivate mostly depend on sharecropping. They prefer to take *kot* because they can use it as if it is their own. They can prepare the land and make their own cropping decisions. There is no patron to dictate or influence their decisions. They also take care of their crops because they want to earn as much profit as possible within a short period of time (as we have seen in case of Alam). Sometimes it happens, when one crop fails for some reason, the mortgagee quickly plants an alternative crop, as he does not want to miss having any crop from that land, because he has invested money in the plot. For example,

> Jaker, a poor farmer, took one high land as *lease* for three years. His plan was to make good profit from this plot within this period. At the time when took on this plot, there remained enough time to plant a short period crop before the main cropping season. However, he did not do this because it would have decreased the fertility (*shokti*) of the land. He planted papaya in the summer but due to high temperatures most of the plants were damaged. After this, he planted banana seedlings on that plot thinking that he would get better price at market.

If he had been a sharecropper, he might have sought help or permission from the landowner, and that would have delayed optimum cropping of the land. It may even had remained fallow for that season. But as he had the authority to make decisions, he did not delay.

The mortgaging system not only influences cropping decisions but it is also a system of land use that helps to minimise land inequality between farmers in rural areas. Under this system, poorer families with a deficit budget, lose control of their land for a period of time (in some cases forever). On the other hand, they get informal finance by mortgaging some of their land, and with this money, they can manage their crops and support themselves in lean periods. They also try to adopt alternative ways of sustaining themselves by selecting specific crops for cultivation or by borrowing money from formal institutions.

4.5 SHARECROPPING

The purpose of this section is to explore how farmers in Ujankhalsi gain access to land through the sharecropping arrangement, and the complex relationships behind this system. It will subsequently be shown that this arrangement plays a vital role in obtaining access to land by the majority of the peasants who manage the land with varied success in order to maintain their livelihood.

4.5.1 The System

The sharecropping system is locally known as *bagi* or *adhi* and the sharecropper as *bagider*. Under this system, a landowner hands over his lands to tenants for cultivation. The details of sharecropping vary considerably between areas. Normally, the cost of cultivation is borne by the *bagider*, and occasionally, costs of inputs are shared with the landowner. The product is shared between the landowner and *bagider* on a 50: 50 basis. The period of a sharecropping contract varies from one cropping season to a number of years.

Early British Administrators, like H.T.Colebrook in the 1870s, mentions various forms of sharecropping in most areas of Bengal (Hunter, 1875; Government of Bengal, 1940). In subsequent decades, sharecropping became increasingly widespread, by the 1940s covering at least 20 per cent of the total cultivated area of Bengal (GOB, 1940). Since Independence in 1971, various government agencies have examined the agricultural production in Bangladesh. According to the First Five Year Plan about 83 per cent of farms were cultivated by owners and 17 per cent by sharecroppers (GOB, 1973). The Land Occupancy Survey, 1977, reported that 23 per cent of the land was cultivated by tenants, although this varied considerably from district to district. Jannuzi and Peace (1980) report tenancies varying from 11 per cent to 88 per cent depending on its nature and place. In Ujankhalsi, it is the most common form of leasing system with about 85 per cent of total households were engaged in this system (Table 4.2).

Table 4.2 Extent of sharecropping system during 1998-99 in Ujankhalsi village.

Type of sharecropping	Rich farmer	Medium farmer	Small farmer	Poor farmer	Total
Rent out	20	40	9	9	78
Rent in	-	19	95	162	276
Rent out and in	3	11	4	12	30
No rent	1	15	11	47	74
Total	24	85	119	230	458

This Table shows the importance of sharecropping as a means of production. It is, therefore, important to identify the participants and their relations and the terms and conditions under which they enter into the system.

4.5.2 Terms and Conditions for Sharecropping System:

The traditional terms and conditions of sharecropping are that landowners should receive one half of the crop and tenants receive the other half. The normal pattern of

cost sharing in Ujankhalsi village is that the tenant is responsible for the plough and labour and any labour costs, if he has to hire wage labourers in critical periods. The tenant should also provide the seeds. If he receives these seeds from the landowner, the costs of seeds are deducted after harvesting the crops.

After the introduction of HYV crops and dry season agriculture, terms and condition have become more complicated. HYV crops require more inputs and care and the distribution of shares depends on who supplies what. The allotment of shares also depend on the bargaining strength of the two parties. From the Table 4.4 one can see that various households are involved in the system. In some cases, even rich farmers may cultivate land as sharecroppers. In these situations it is obvious that bargaining conditions are not uniform. In general, when the *bagider* and landowner agree a contract, they consider:

- What type of crops will be grown in which season on that plot, and how the cost of production shall be shared;
- How they will divide the crop and where the division will take place;
- How the by-product will be divided; and
- What is to be the length of the contract.

From discussions with farmers, it seems that sharecroppers believe that the terms and conditions of sharecropping favours landowners, whereas owners think they favour the *bagiders*. However, the socio-economic position of landowners usually enables them to dictate the terms under which *bagider* can have access to land. Furthermore, a large number of sharecroppers compete with each other compared with a smaller number of land owners who let out land. If the *bagider* is in the weaker position, the landowner

may make decisions unilaterally about the terms under which the *bagider* will have access to the land. In such cases if he fails to comply with the demands of the landowner, he might be evicted from the land. This is not only exploitative but it also contrary to the country's tenancy law[4]. However, landowners can deviate from this rule due to their position at local level and, also, have influence over national level (Jahangir, 1979; Dutta, 1998).

- Some common crops grown by sharecroppers and the responsibility for the necessary equipment and subsequent distribution of the produces are listed below:
- Paddy, traditional cultivars: the tenant is responsible for the plough, labour and seeds and the produce is divided equally.
- HYV paddy: in *aus / aman* (pre-monsoon or monsoon) season; if the cost is borne by the tenants, the produce is shared one-third to landowner and two-third to *bagider*. The straw will be divided accordingly.
- HYV paddy in dry season: one-fourth of the crop is kept aside for the cost of the irrigation water (if the water comes from a water seller, he will take his share from the field or if the tenant supplies the water, the tenant will take this share).
- Onions in the winter season: the costs of seeds are borne by both parties equally, the share should be divided equally or if other costs are borne by tenants, one-third for landowner and two-thirds for the *bagider*.
- Onion in dry season: if the water is supplied by a water seller, it is at the rate of 800 *taka* per *bigha* for water (it was 700 *taka* during 1997) and if all other costs are borne by the tenant, the produce will be shared one-fourth to

[4] According to the country's tenancy law the product of share cropped land should be divided in the following manner: (1) one-third shall be received by the owner of the land;(2) one-third shall be received by the sharecropper for his labour; (3)one-third shall be received by the owner / sharecropper or by both parties in proportion to the cost of cultivation.
This law also mention that landowners cannot simply evict a sharecropper within a period of at least five year (GOB, 1984 taken from Dutta, 1998).

landowners and three-fourth for the *bagider*, or if the cost is shared equally by both parties, one-third for the landlord and two-thirds to the *bagider*.

- Chilli in all seasons: if the cost is borne by the tenants, one-third of the crop goes to landowner and two-thirds to the *bagider*. Normally, the *bagider* is responsible for selling the chilli and then the money is divided.
- Wheat (cultivated in dry season): if the costs are borne by tenants, one-third goes to the landlord and two-thirds to the tenant, but if the cost is shared by both parties, the produce is shared equally.
- Jute (cultivated during monsoon): the tenant is responsible for the plough, labour and seeds and the produce is divided equally.
- Banana / papaya (annual crops): the costs of seedlings are borne by both parties equally. If other costs are borne by both parties equally, the share should be divided equally or if other costs are borne by tenants, one-third goes to the landowner and two-thirds to the *bagider*.
- Other vegetables: if costs are borne by both parties equally, the produce should be divided equally but if costs are borne by tenants, one-third goes to the landowner and two-thirds to the *bagider*.
- These are the normal terms and conditions that prevail in Ujankhalsi village. Although they may seem straightforward, in practice they are not. There are many seemingly hidden conditions in these contracts.

4.5.3 Factors Considered by Landowners in Providing Land for Sharecropping:

As mentioned in the previous section, HYV crops need large inputs and care which is difficult to manage for by farm families who may lack sufficient manpower and possess a low level mechanisation. As the small-sized plots are owned by different households, it would be difficult to use machinery on them even if it was available. In this situation, the wealthier are interested in allotting some of their land for *bagi* (sharecropping) or mortgaging. In the rural areas of Bangladesh, cultivators are treated

as *chasha*[5], low-class workers. Members of rich families are reluctant to work in the field like labourers. Moreover, in wealthier families, members are more likely to be educated and so are not interested in farming on the land. They take on other jobs or engage in business. In these cases, farmers consider allotting some of their land for *bagi*. After discussion with farmers, I understood the following factors which landowners take into consideration when leasing out land:

- too much land to cultivate by own household;
- minimising farming costs;
- insufficient time to look after their land;
- plots too distant from landowners' house;
- small sized plots which are awkward to manage;
- to minimise risk in particular season (monsoon);
- less fertile land which requires large inputs.

Who would be suitable tenants for a landowner? In most cases, landowners seek tenants from those whom they expect to get the most benefit. From discussions with farmers, I found the following general criteria followed by landowners in selecting a tenant farmer:

- farmers with sufficient available labour, tools and cash to manage the land;
- a capable farmer who shows respect and will share fairly
- farmers who have water availability in dry season
- neighbour plot holders
- a poor relative who is a good farmer
- a tenant who lives near the plot.

[5] In Bengali, *chash* means cultivation and *chasha* means who cultivate i.e. cultivator. People often use this word for reproaching an ill-mannered person.

When giving land over to a sharecropper, the landowners' judgement of prospective tenants is the main factor. His position gives him the right to choose tenants and impose conditions on cropping patterns. For example, Hazarat, the headmaster of the local High school, who is also a rich farmer in the village, has given several plots to tenants. As a teacher, he has insufficient time to look after all of his land. He has some plots which are far away from his house. He has given these to Jashimuddin, who is a good farmer and lives near the plots and to Siddique, whom he judges to be a good farmer with sufficient labour to manage land, has two plots to sharecrop. Hzarat has also given two plots for sharecropping to Atahar, his close neighbour, who is a hardworking man and manages the land efficiently.

In most of the cases Hazarat placed certain conditions on his tenants e.g. what specific crops to grow in a particular season. I discussed this with Atahar, he said

> " *bhai* (headmaster) has given me two plots on condition that on one plot should grow *secha piaj* (onion in the dry season) and on other one I would grow *irri* (HYV paddy) in the dry season. On both plots I can grow any crops in other seasons according to my choice".

In this case, he has no freedom to choose crops in his sharecropping land in the dry season. The landowner sets the plan. This is a constraint on the tenant, who may perceive that some other crops are more suitable for that plot, other than onion or paddy, however, he is obliged to follow the direction of the landowner.

Atahar also has obtained another plot in the Choto *beel* from his neighbour, Ismail, who allows him to grow crops only in the monsoon season. The monsoon season is a risk prone season in *beel* land and Ismail has allowed him to do so as to avoid risk to

himself. Here we can see that the landlord is not willing to take any risk of his crop in the monsoon season. Instead, he imposes the risk on his sharecropper who has to face problems in getting a successful harvest from that land. Although he is free to grow any suitable crop, due to flooding, he is restricted in doing so. So in both cases, cultivators cannot make cropping decisions freely, as they are dependent on other factors. From the discussions with farmers, it seems to me that most landlords prefer to impose restrictions on crop choice on sharecroppers. Sometimes misunderstanding occurs between landlords and tenants.

In the dry season, crop cultivation is impossible without irrigation water. In other seasons, crops may grow with rainwater but sometimes need irrigation water. Sharecroppers, by installing pump sets on their plots, gain access to others' land. During my fieldwork, I found many cases where sharecroppers used this policy to gain access to land as a sharecropper. They do not want to provide any water for other plot holders who have land near their water-pump. This was a subtle move on their part for if the plot owners are interested in growing dry season crops, they have no alternative way to give their land for *bagi* to the pump set owners. Abul, a medium farmer, has one plot near Nazim's shallow tube-well in the Padma *beel*. He said,

> "..once I asked Nazim to supply irrigation to my land during the dry season, but he refused to supply the water. Instead of that, he asked for that land for *bagi* and I had to give it for that land. Otherwise, it would remain fallow during dry season"

In other seasons, most shallow tube-well owners supply water to others' land in return for cash or kind. In some cases, I found that landowners gave land for *bagi* to machine owners only in the dry season. And for the rest of the year, they (the landowners) grew crops there themselves. As I found, they used to lend their machines to their landlords

for drawing water for their other lands or they would even help them physically when necessary. They do this to maintain a good relationship with their landlord.

> Moslem has little land of his own. He has sunk one shallow tube-well on his small plot. His father-in-law has two plots nearby which he cultivates as a sharecropper. After sinking the tube-well he refused to sell or supply any water to surrounding plot owners and, eventually, he got those plots for himself. Now he has access to 25 plots and has about 1.72 acres of land as *bagi*. However, he had to ensure these plot owners about the security of the crops in the dry season. In 1997, he had a problem, when the aquifers went down. He, immediately, contacted a nearer deep tube-well owner and bought water from him and supplied water to these lands.

With the help of these tactics, many medium or small farmers have gained access to land, but many farmers have lost full access to their own land. They have manpower, tools, and can afford inputs, but have no water supply and due to this, they are not able to cultivate desired crops there in the dry season. Poor and small farmers also have problems. They have little land at their disposal but not access to irrigation water. So, due to this, their cropping pattern varies. Sometimes these poorer farmers end up working as day labourers on their own land. This is a reversal of the usual relationship, landowners having become dependent on sharecroppers.

Different types of credit are linked to maintaining or obtaining a sharecropping arrangement. In some cases, landowners provide loans to their tenants to ensure proper management of crops. They supply seeds and money sometimes without interest. Subsequently they deduct the amount spent for those from the crop sales after the harvest. Here the interests of the owner are three-fold: 1) they want to ensure good crops; 2) as normally the price of seeds is higher at sowing period than post-harvest and if they calculate the value of seeds (normally they do) and take a share of the produce based on that value, they can obtain a profit. In the latter case, they are selling their seeds at market value, which they themselves may not be able to sell in the

market. Those who lend money for seeds (actually the value of the seeds), are also using their money and getting more profit by doing this because their interest rate is higher in most cases than is that of the money-lenders; and 3) sometimes wealthier farmers give credit to their sharecroppers hoping that they will not be able to pay back that loan and then they will buy or take out a mortgage of the sharecroppers' own land. There are some instances where poorer households mortgage their land to their patron and work as sharecropping on it and, ultimately have to sell their land due to the burden of their debts (this will be discussed later in this section).

I found several sharecroppers who were able to help their landowners by providing loans in distress conditions such as for medical treatment, for fighting court cases, etc. The reasons for providing this help, is to maintain good relations with the landowner. The borrowing of land is not a simple impersonal agreement but rather a multi-stranded relationship between both families (Jansen, 1987; Datta, 1998). If any conflict arises, the landowner might consider to evicting his sharecropper but in this case he might consider that he may need his help during times of hardship and so refrains from this.

4.5.4 Sharecropping and Employment:

The sharecropping relationship between a tenant and landowner is linked to employment. This type of linkage also depends on the economic position of the two parties. Sometimes poorer farmers need to sell their labour to their landlords. Normally, these landlords rely on the labour market for obtaining labourers but I found, in particular situations, tenants have to help their landlords by providing labour. This is found, mainly, in the peak period of cultivation or after harvest, or any natural disaster

e.g. early flood, hailstorm, etc. Landowners who have a shortage of labourers, in emergencies situations, are helped out by some sharecroppers who are also wage labourers. They receive normal wage rates, but, due to emergency situations, they may help their landowners in order to maintain a good relationship with them.

4.5.5 Sharecropping and Political Patronage:

Landowners sometimes choose their tenants from a political standpoint. This political support may be required in village affairs such as *bichar* (village court) or national affairs such as a local government election or even in parliamentary elections. I was informed that a sharecropping contract can be obtained for such a favour. In fact, I witnessed several cases where sharecropping contracts were lost due to the displeasure of such political patrons. For example, Monsur, a rich farmer, is a member of a national political party. He and a relative are also influential in this village. Once he competed for the post of Chairman of the local Union Council. He failed to win and thought that it was because his sharecroppers, whom he had counted on, had supported his opponent. His family was angry and threw off the sharecroppers from their land who were thought to be his opponent supporters. His relatives in Sarker *goshthi,* who have local power, were also angry at losing the chance of Chairmanship and consequently political power in the village or its nearby area. They also reclaimed land from sharecropping farmers, who were thought not to have voted for Monsur. Even Monsur's father-in-law threw some sharecroppers off from his land for the same reason.

From the above discussion, it is clear that the political and economic power of these leaders is needed to strengthen their position. These rich farmers by their strong

position in the society, attempts to control over means of production (Shanin, 1972; Arnes and Beurden, 1974; Jahangir, 1979). The access to power is important because the control means of production allows them to dominate their subordinates and control the decision-making process of their agricultural production. As a whole, the relationship is not straightforward, it is complex and multi-dimensional and many considerations guide and maintain this relationship. It is important not to undermine this relationship when seeking to understand the farmers' decision-making process.

4.5.6 Efficiency of Sharecropping

From what I observed in the village, my impression was that sharecropping is an efficient method of agrarian production. This view however, does not support Bhaduri's (1973) hypothesis, which demonstrates the inhibiting effect of sharecropping on technical change, especially when it is reinforced by indebtedness of tenants to landlords. The argument for this thesis is that a landlord will oppose any intervention, which may increase the earning capacity of their tenants, as this may remove the debt basis of their control and ability to maximise the 'extraction of surplus'. Other authors deal with the matter in relation to the so called 'Green Revolution' in India, which shows that sharecropping is disappearing as new technology is adopted (Bharawdas and Das, 1975; Byres, 1981; Bardhan and Rudra, 1981). My question is: if this new technology is causing sharecropping to disappear why are so many farmers continuing to participate in sharecropping arrangements? My findings suggest that sharecropping is not disappearing rather it continues to prove an efficient method of production. Due to its efficiency, it has endured since earlier times and is still an unavoidable system in the agrarian structure. I believe that with the introduction of dry season agriculture, rich farmers find it difficult to implement HYV technology on all their lands. To utilise

their land and to get crops from their lands, they have to lease out some land to tenants to maximise the use of their land.

There are several reasons for the prevalence of sharecropping. Firstly, the wealthy are not interested in cropping all of their land, because to grow crops they would have to hire additional labour and provide inputs. Secondly, they do not have control over irrigation water at all times in the dry season, a crucial factor. In floodplain areas, nowadays, the dry season is the main season of crop production, when '*ju*' or '*rosh*' (proper soil moisture) is an important factor in crop cultivation (see Chapter 5, section 5.3.1). It is impossible for rich farmers with the equipment available in rural Bangladesh, to prepare all their land for crop cultivation in any season, because the tilling or sowing period only lasts a very short time (Frinkler, 1978; Richards, 1985; Netting, 1993). In these circumstances, they have to lease out some of their land to tenants, if they want it cropped. Under these circumstances, I disagree with Bhaduri's proposition (Bhaduri, 1973).

On the other hand, sharecroppers have to compete with one another in order to obtain land. Sharecroppers take great care in managing their crops, because this is a determinant of their subsistence (Chayanov, 1977). If they fail to manage the land properly, they would be evicted from the land. The productivity of the land is not decreasing due to their careful management (Frinkler, 1980; Barrlet, 1980; Caballero, 1983; Zeeuw, 1997). Moreover, wealthier farmers are able to save time by not having to supervise cultivation and they are using this time and money in other enterprises (business, jobs, etc.). So, sharecropping appears as an efficient method of production in the context of Bangladesh.

4.5.7 Sharecropping and Surplus Appropriation:

Sharecropping features exchange behaviour between landowners and tenants. Through the agreement, tenants receive access to a part of the 'means of production', while land owners receive a part of the product. Therefore, the landowner, indirectly but effectively gains access to labour. The sharecroppers possess labour and require access to the means of production, land, without which labour cannot be utilised. Similarly, the landowners possess the 'means of production' but requires labour in order that the means of production are utilised. Central to the Marxist proposition is that sharecropping is not only a form of rent or labour remuneration, rather it is a method of surplus appropriation through which surplus labour is transferred to the landowner in the form of surplus product (Pearce, 1983; Rudra, 1975; Bell, 1977).

I think the hypothesis is one-dimensional. It fails to explore the complementary and complex relationships among landowners, tenants and the whole agrarian structure. It seems to me from personal observation in Ujankhalsi that it is a complementary system, from which both parties gain benefit from each other and the relationship is not solely an economic arrangement; social obligation is also implied. In fact, landowners frequently become dependent on their sharecroppers and a symbiotic relationship emerges from this socio-economic arrangement.

4.5.8 Sharecropping and Cropping Decisions

The sharecroppers and landowners are dependent on each other. Several factors influence the cropping pattern. If these factors are available to a sharecropper, then he can actively make his cropping decisions but if he is subservient to the landowner, the landowner may have to exert dominance over the decision-making process. When a

wealthy landowner rents out land to a poor tenant, he (the wealthier) often decides what crop to grow, encourage the use of fertilisers, insecticides, proper weeding, supply of proper irrigation water, etc. Moreover, apart from these decisions, he may exert further supervision. Several times, I observed landowners deciding the schedule for the preparation of land or identifying the best period for cultivation and transplantation. Sometimes, their interventions force sharecroppers to buy additional labour and animal power at certain periods, although some of their own resources remain unutilised.

There are some able sharecroppers who make cropping decisions and on whom landowners rely but they keep the landowners informed. Actually there remains a great variation in control over the means of production and as such the decision-making process varies on the basis of context, which can only be understood from the constraints and opportunities face by both parties.

If we examine a case study of a farm family, the situation regarding the land resources and its impact on the decision-making process, would be clearer (Box 4.3). From the above case, can see Kamal separated himself from Jamal in the hope of getting a better life. Unfortunately, he did not succeed. Kamal took the irrigation set instead of the plough set with a hope that he would able to grow crops during the dry season but he had no plough, it was difficult for him to bear all costs of HYV dry season crop cultivation including plough hiring. If a farmer has no plough, a landowner will not give him any land to sharecrop. Jamal had a plough set and also was known as hard working man. Therefore, all sharecropping land went to him. His strategies were, in time, successful and he was able to consolidated his position.

Box 4.3

Jamal and Kamal are two brothers whose father committed suicide 10 years ago. At that time, they were 32 and 18 respectively and they lived with their mother. They had four sisters, three of whom had married while their father was alive. As Jamal was the eldest, he began to look after the farm. They had 4 *bigha* 18 *katha* (1.6 acres) of their own land and more 2 *bigha* held as a sharecropper. After one year, they arranged the marriage of their youngest sister for which they had to pay a dowry of 20,000 *taka*. As their father died unexpectedly and there was no surplus money, so they had to sell 6 *katha* of land and mortgaged 10 *katha* to cover their expenses. Then Jamal arranged Kamal's marriage receiving a dowry of 10,000 *taka*. They cleared the debt of the mortgaged land with this money. They continued to live in the same household. Soon after Kamal's marriage, their mother died. When Kamal married, their sisters came and demanded their share of the land but Jamal asked them to wait for a few years. Jamal planned to start *faram* (dry season agriculture) and bought one Shallow Tube-well (STW) by selling a 5 *katha* plot. They got a good crop on that year. However, after one year, Kamal decided to establish a new household. They divided the land between brothers and sisters, the brothers kept other assets like trees, shallow tube-well, and the bulls. Each brother received 36 decimal of land and each sister 18 decimal. Kamal demanded the shallow tube-well and Jamal bulls. The reasons for the separation was that Kamal thought, as he had no child, he would be much better off, economically, whereas Jamal had two children. Jamal had a good relationship with the land owners they sharecropped with, they knew him as a hardworking man who had bulls and a plough set. All sharecropping land belonged to him. On the other hand, Kamal had no bull and he had to hire a plough to cultivate his land which was difficult for him to obtain. He also failed to grow good crops on two subsequent years in the dry season due to water shortage. He fell into serious debt and planned to sell 5 *katha* of land so as to cover the debt. In the meantime, Jamal had consolidated his family's condition by curtailing food consumption, careful crop cultivation, selecting and managing suitable crops (mainly paddy, wheat, onion, chilli, banana, etc.). He also asked his sisters and brother to let him know if they wanted to sell their land before making any decisions. He wished to combine the plots again as they were earlier and maintained good relationship with them.

The land which Kamal had could scarcely provide 6 months paddy and some onions for cash, whereas Jamal was able to manage his families subsistence all the year. Every year Kamal had a deficit and had either to sell or to lease out his land to manage the situation. Once Jamal's two sisters wanted to sell their land and he showed interest in buying them, but he had insufficient resources. He sold a piece of fallow land, leased out three plots on condition that he would cultivate them as a sharecropper and sold one jackfruit tree to obtain money. Over 8 years, he bought another share of land from his sister and one plot from his brother and established himself as a solvent farmer. He also bought a shallow tube-well machine to cultivate dry season crops which allowed him to get more sharecropping land. On the other hand Kamal had to sell his pump-set, because it was not working properly and he had difficulty in purchasing parts. He began to work as a day labourer on his brother's land (it was shameful for him to work on others' land). Jamal helped Kamal when necessary with cash or kind. He advised Kamal to take loan from him, to clear the debts on his mortgaged-land. Kamal did this and, in return, he gave one plot leased out to him on which Jamal allowed him to sharecrop. Jamal continues a good relationship with Kamal in a hope that if, any time, he wanted to sell any land, that Jamal could buy.

On the other hand, Kamal's decisions did not match well with his resources and environmental constraints. He did not enter the labour market during the period of

crisis. This was because he considered his family's reputation in the village for never selling their labour. Instead of labouring, he began to borrow money from people by giving land in *kot* or by selling it, which was detrimental to him. Jamal saw that if his brother continued in this way, he might end up selling all his land to other people. So he planned to help him and provided work for him on his land. Kamal did not think that his brother was exploiting him. Jamal did not attempt to take land away from his brother, rather he was careful to see that his brother was not exploited by outsiders (i.e. from outside their lineage). Such reciprocal relationships are important to this study. Here the relationship between two brothers is complicated, complementary and contradictory.

These two brothers started their separate family lives with similar resources. In terms of technical experiences, they got more or less similar instructions from their parents. However, their decision-making process differed. This was due to their cognitive perceptions of the events. On the basis these perceptions, they operated their farming systems differently. This personalistic attitude has significance in making actor's own decisions.

4.6 CONCLUSION

In this chapter, I have discussed the forces involved in the land distribution system of a floodplain village. In Bangladesh, availablity of land is scarce and with only 0.2 acres per person at present and with the high population growth rate (2.17 percent per annum), it is decreasing all the time. Land holdings are also disintegrating and plots are becoming smaller. The Land Occupancy Survey showed that during 1977-78 the

average holding was 1 acre but after 20 years has become 0.20 acres (Chowdhury, 1998).

As can be seen from the above discussion, different 'Land Reform Acts' and their 'Amendments', failed to redress the inequality of land holdings. This may be difficult to redress this by any further Act or an Amendment under the prevailing socio-cultural context. The effect of the laws of inheritance and their impact on livelihood has been examined and it has been shown that basically this land distribution system is socio-culturally embedded in the farming community. Considering all available opportunities and constraints, people have developed different internal arrangements by which they can gain access to this essential resource. So the intertwined social, economic and political relationships are being used by local producers effectively where a symbiotic relationship exists between the different stakeholders. If the land distribution is considered in isolation and if these relationships are overlooked in implementing any new measures (such as legal ones), it may create the opposite effect than is intended. It may also increase unease among the people and, ultimately, undermine social cohesion, and have a detrimental impact on the whole agrarian system.

In terms of decision-making process, we have seen, it varies with the ways one is gaining access to this resource and his mental perception regarding the situation and his ability to make use of the situation.

5. LAND RESOURCES

5.1 INTRODUCTION

This chapter deals with the local people's perception of their land resources and how they apply this in making agricultural decisions. In the floodplain of Bangladesh, farmers own small fields due to socio-cultural and economic reasons (see Chapter 4). These fields are scattered throughout the cultivable regions on the flat, slopping *beel* area. Here soil varies within short distances due to land elevation and the nature of silt deposition. Most studies related to soil resource and its uses in Bangladesh focus on ideal land use as a function of ecological factors (Jannuzi and peach, 1980; Hossain, 1991; Brammer, 1994). However, these studies do not deal with the local people's knowledge about land resources and socio-cultural factors, which interact in their management practices.

Sillitoe (1998a) citing examples from Papua New Guinea, Indonesia and Bangladesh, emphasises the need to incorporate indigenous knowledge and the cultural values of the farmers regarding the land resource in agricultural development. However, he does not mention how these two factors determine the actual behaviour of farmers. Farmers often possess a tacit understanding of their land and soils but when they go into 'action' the extent to which they apply their best understanding in decision-making process has significance. This chapter aims to explore how these perceptions are socio-culturally embedded and the relationship between cognitive and behavioural aspects, which reflect in their day to day farming activities.

5.2 LOCAL LAND USE PATTERN

This section discusses how people define their land and soil when making their cropping decisions. Land use is an expression of the way that people manage their natural resources in order to satisfy some of their basic needs. Farmers select their field sites, which, in their experience, are particularly suited to an individual crop. They set up plans for their crops by considering the position of land, total number of crop-plots they possess, the particular season and their consumption need. From personal observation, it appeared that their management strategies were based on an intimate knowledge of land and soil quality of the plots.

5.2.1 Farmers' Classification of Land

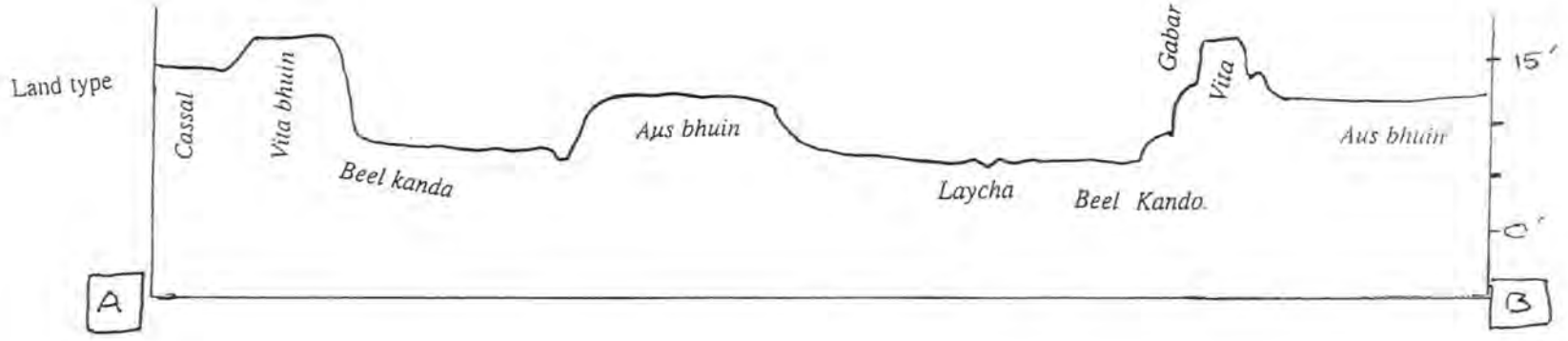
Farmers do not classify their land according to the principles of western science such as high, medium or low land. Different cultures classify according to different principles such as physical propertities, ownership and rights of social units, agricultural properties of soil, human activities associated with use of land, native agro-ecological zones, etc. (Davidson, 1983; Rhoades, 1994). Kerven *et.al.*(1995) indicated that farmers in northern Zambia used two dimensions, slopes and predominant vegetation, to describe their lands. Ujankhalsi farmers classify their land as *jomi* or *bhuin* primarily on the basis of extent of flooding. Crop suitability, also, comes under consideration when they classify them.

On the basis of the extent of flooding, farmers designate it as *danga jomi* (flat food free land) and *beelan jomi* (regularly flooded land). Within the *danga jomi*, they also have subdivisions such as *vita bhuin i.e.* a flood free area, suitable for homesteads (*bashat bati*), vegetable gardens, horticultural crops and crops that require little water or are

drought tolerant. Farm families cultivate crops all year round here. They designate *danga bhuin*, land, which is infrequently flooded, where floodwater normally does not stay more than a month. It is not suitable for *bashat bati* but suitable for a number of other crops, which they can cultivate throughout the year. *Kandor* is slightly depressed land within the *danga jomi,* which is flooded by rainwater but not water from rivers. This land is also suitable for cropping the year round.

Farmers call the land within the *beel, beelan jomi*. Here land is flooded frequently, every monsoon, by water from outside, such as from the rivers or by water from other surrounding *beel,* which overflow. There are, also, some subdivisions of this category of land (Figure 5.1).

Aus bhuin: The *aus bhuin*, which is flooded every monsoon where floodwater cannot exceed *ek-buk* (chest height). This land is suitable for cropping the year round with suitable crops in accordance with the changes in the water regime. For example, flood tolerant *aus* paddy or jute during monsoon period and onion or other vegetables during the dry season. Farmers can define more subdivisions within this *aus bhuin*, in accordance with its suitability for cropping. For example, farmers call some land as being *shany-er bhuin*. A number of cultivars remain here under *aus* paddy (e.g. *shany*, *gobra*, *koijur*, *chaina*, etc.). *Shany-er bhuin*, means that the land is more suitable for this cultivar than for other cultivars in this group. Likewise they designate *gobra bhuin* or *koijur bhuin*. Each cultivar can tolerate a certain amount of flood depth. For example, *shany* variety cannot tolerate the flood depth, which the *gobra* variety can.



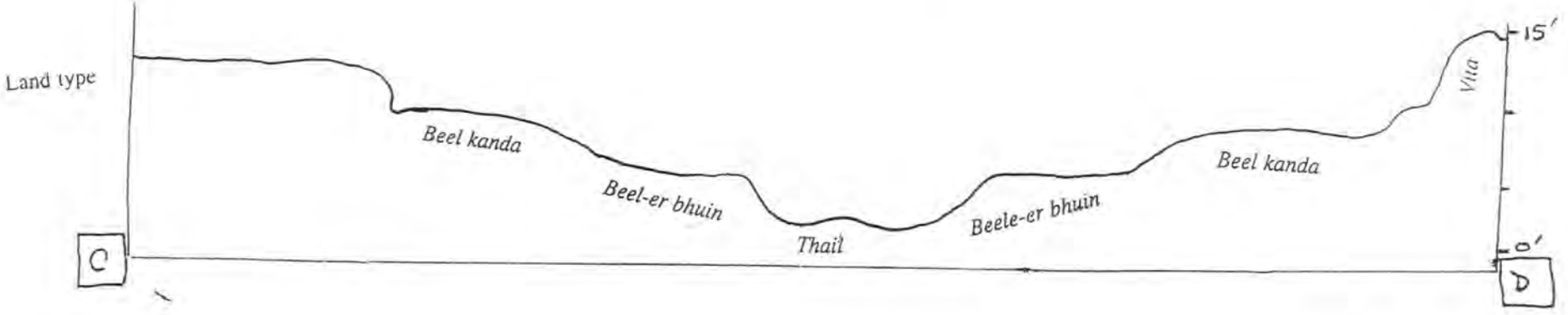


Fig. 5.1 Diagram of indigenous land types along the transects

Scale : 16 inches = 1 mile

Beel kandari: The *beel kandari* is situated at the edge of the main *beel* depression. In Bengali, *kanda* means edge (such as the edge of a vase). Here floodwater rises around *ek-manush* (man height) and stays 70 to 90 days. This land is also suitable for two crops in a year, one in the monsoon - semi deepwater *aman* paddy cultivar, the *digha,* and another in the dry season. The other name for this land is *digha bhuin* - after the name of the paddy cultivar.

Aman bhuin: The *aman bhuin* is another sub division of *beelan jomi.* Here flood water ranges from above 'chest height' to *dui-manush* (two man height) during the flooding period. The land is suitable for two crops a year. Farmers can grow deepwater *aman* paddy during the flood period, but in recent times they seldom grow these cultivars, rather they prefer to keep this land fallow during this period. Floodwater stays here for more than four months and after the receding of the floodwater, it is possible to grow only one crop before the coming of the next flood. Recently farmers have begun to grow *irri* (HYV paddy) during the dry season. Farmers sometimes call this land *irri bhiun* (IRRI land). This *aman bhuin* also has some sub-divisions: for example, *soli bhuin* for those lands which are suitable for deepwater *aman* paddy i.e. the *soli* cultivar. Similarly, *boroamna bhuin* - is suitable for the *boroamna* cultivar. Figure 5.2 gives the names and terms used to identify particular land types. This figure is drawn on the basis of random sampling of plots for interviewing farmers within the Padma beel. A total of 215 plots have been studied to understand farmers' knowledge about their land and soil. The plots which had not been studied, remain uncoloured.

Beel-er laycha: The *beel-er laycha* is a type of *beelan jomi* from which water drains into the deepest point of the *beel.* This land is suitable for only one crop during the dry season.

Beel-er thail: The *beel-er thail* or simply *thail* is the lowest point of the *beel*, and it is more or less permanently under water. Normally, people dig a *kua* (ditch) within this area so as to allow fish to take shelter in the dry season and which enabled people to catch them there easily. Farmers also crop local *boro* paddy here. This does not require tillage and the rice grows without fertiliser. Farmers also call this type of land the *borar bhuin.*

Farmers are quite concerned in selecting the appropriate crop according to the suitability of their land. If some one fails to plant wisely, he would be treated as a non-efficient farmer. To this context farmers often cite a proverb:

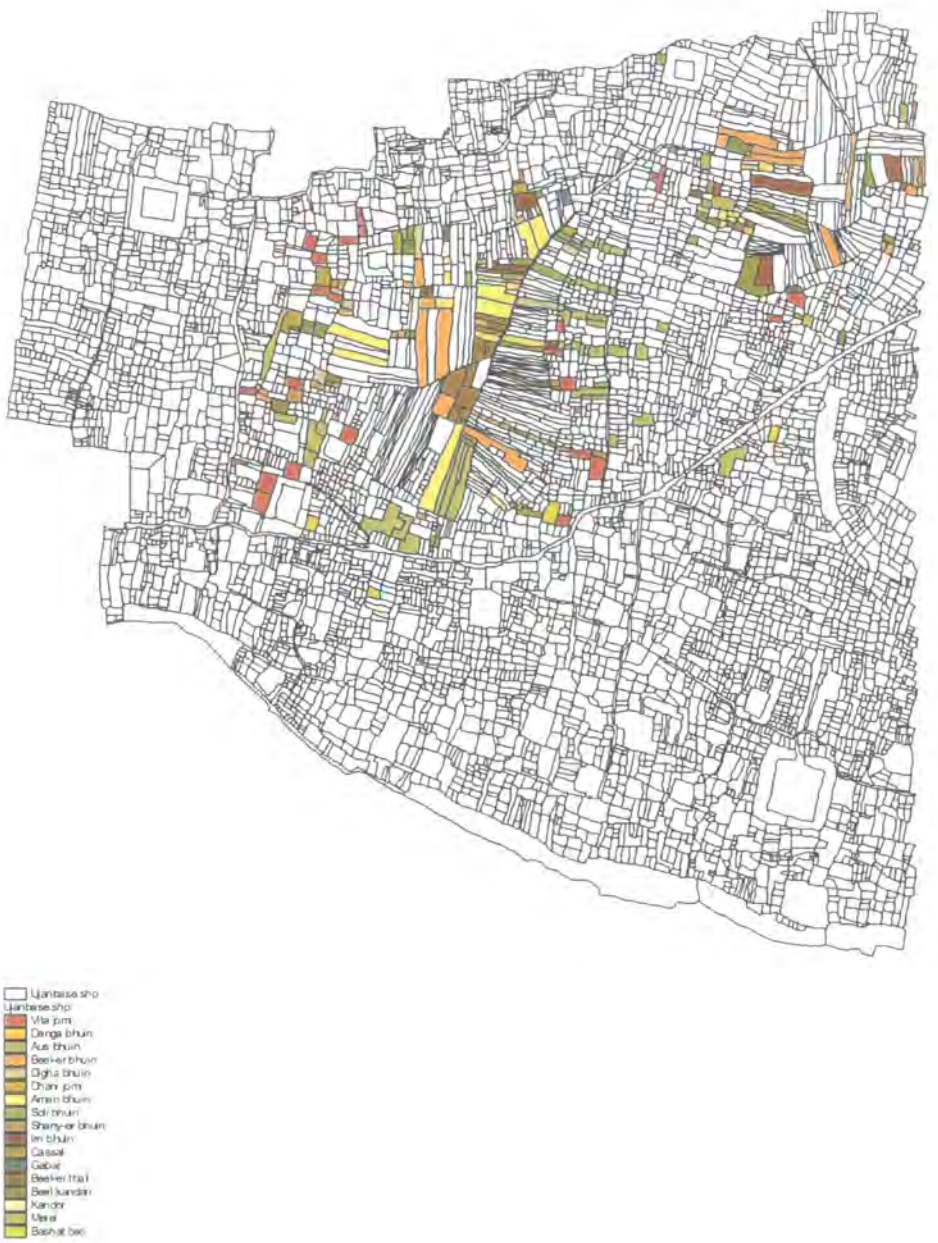
"bhuin chenena kala bhogna
Aus bhuin –e bone boroamna"

It means, the 'non-efficient farmer' (*kala bhogna*) does not recognise the approproate land (*bhuin*) for a crop. As a result, he cultivates *boroamna* (a deep water *aman* cultivar) on the *aus* land (*bhuin*). *Boroamna* is suitable for *aman bhuin* (land) not for *aus bhuin.* Only *aus* paddy is suitable on the *aus bhuin.*

From the above land classification, it is evident that what to scientists is 'medium low' land, to the farmers it is *aus bhuin.* Farmers call it *aus bhuin* because local *aus* paddy grows well there in *aus* season on what is low land or very low land, on the basis of their floodwater depth, called by farmers as *aman bhuin.* They are specific in defining their land. The above land classification also suggests that farmers relate the type of crop (e.g. *aus* or *aman* paddy), which can be grown there with their classifications. This in turn is related to what type of paddy can tolerate that flood depth (Figure 5.2).

Figure 5.2

Indigenous land categories of Ujankhalsi village



In the Bangladeshi farming community paddy is involved in every aspects of their livelihood. The following quotation will be helpful for clarifying the impact of paddy on Bengali culture

> "..paddy dominates the landscape, the villagers diet and often their thoughts. As Eskimos have many words for snow, so Bengalis have many words for rice. Unhusked rice (which called 'paddy') is *dhan*, husked rice is *chal*, boiled rice is *bhat*, and each of the dozens of rice varieties has its own name" (Hartman and Boyce, 1983:19).

Paddy is so important for the local people that they designate their land under the name of a variety of paddy variety which could be grown there, even if they intend to use it for a different crop.

Chora

Farmers in Ujankhalsi village use the term *chora* for certain areas within the *beel*. Each *chora* has a certain significance, with its own terminology, in regards to agriculture. For example:

Musrer chora: *Musur* (red lentil) grows well in the *chaitally* season in that area of the *beel*. Farmers say that the soil moisture (*ju)* of that area is suitable for this crop after the floodwater receedes. This land is also suitable for HYV paddy and onion in the dry season and *aus* paddy in *aus* season but in spite of these crops being grown here, the area is still termed *musurer chora* after the main crop the red lentil.

Harkata chora: *Har* means bone and *kata* means harvesting (cutting). Farmers often use a folk tale in reference to this *chora*. In one year there was a very good *aus* paddy crop. When the crop was about to be harvested, a farmer came to look at it, planning to arrange the harvesting date. He learnt that a *ban* (flood wave) was coming from the

river and so it needed a very quick harvest to save the crops. He sent a message to his fellow farmers and got ready to harvest his own plot. However, he had no *kachi* (sickle - paddy harvesting implement) with him so he began to harvest the crop with a *har* (bone), which he found nearby. Later, with the use of a *kachi* he managed to harvest his crop successfully. From that time, the area has been known as *harkata chora*. This area is suitable for *aus* paddy.

Lalikanda chora: *Lali* is the same as *nala* that means narrow drain and *Kanda* means edge. One *nala* enters into this *chora* from the nearer canal, which is the source of irrigation water during dry season. Farmers can grow wheat in the dry season in this *chora* because of this *nala*. Although the canal dries up during late summer, farmers manage to grow a certain type of wheat (e.g. *kanchan* or *sonalika* cultivars), which requires little water.

Neem tola chora: *Neem* (*Azadricta indica*) is a popular tree in this area. There is *vita bhuin* (high land) near this place where there is a big, old *neem* tree and a few smaller ones. Farmers often designated this *vita* as *neem tola vita* and the land area as *neem tola chora (tola* means underneath). This *chora* is suitable for HYV paddy in the dry season and sesame and jute in the *aus* season.

Chrorar pukur: *Pukur* means pond and *Chorar pukur* means a pond within *chora* i.e. with the *beel*. Normally, *pukur* are found in higher land areas not inside the *beel*. But in this village there are two ponds with high embankments remaining within the *beel*. These are constructed to harvest fish and flood water. The water is used for irrigation during the dry season.

From the above account it can be ascertained that farmers designate different parts of the *beel* according to its potential use and its history. To an outsider, the areas may seem similar and so suitable for similar crops, but to farmers they are not so. They can recognise a specific area and, through experience, identify the best cropping cycles.

5.2.2 Farmers' Classification of Soil

Systematic studies of farmers' knowledge of soil types, their soil classification and land evaluation system has been carried out in some countries. For example, in Nigeria (Osunade, 1988 and 1992), Rwanda (Habarurema and Steiner, 1997; Steiner, 1998), Zambia (Sikana, 1994; Kerven *et. al.*, 1995), Indonesia, (Grobben, 1992), Papua New Guinea, Indonesia and Bangladesh (Sillitoe, 1998d), India (Talawar. 1991), Nepal (Tamang, 1993), Peru (Guillet *et. al*, 1995) and in Swaziland (Osunade, 1987 and 1992). Except Sillitoe (1998d), no work on farmers' knowledge of soil and its importance in agricultural development is available in Bangladesh.

Although many Bangladeshi researchers come from farm families, they fail to take account of local knowledge of soil type in agricultural development. Often they consider this knowledge inferior to scientific studies and that it has no relevance in agricultural development. The importance of the research reported here is that it deals with farmer's perceptions of soil and how they use this knowledge in making cropping decisions.

Farmers are interested mainly in the features of the topsoil, which mostly influence their cultivation and management practices. By looking at the topsoil, farmers can

recognise its agronomic properties, which are important to them. Initially, they may observe a single notable feature (be it structure, colour, fertility, consistency, etc.) and so name the soil, but this does not imply that they are unaware of the soil's other characteristics. They do consider other characteristics when they select which crops to grow.

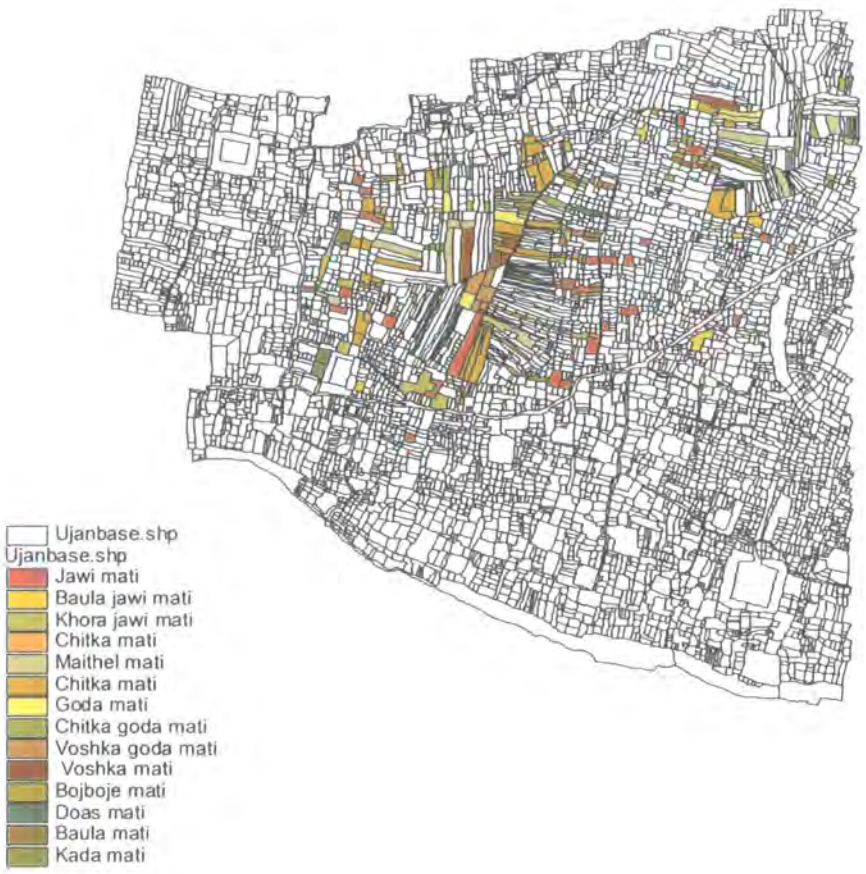
One aspect of the indigenous soil classification system is the farmers' method of naming and describing individual soil types. The local term for soil is *mati*. Figure 5.3 gives the names and terms used to identify particular *mati*. From this figure it can be seen that farmers have sound knowledge about their soil. They consider several ecological factors when defining each type of soil.

Baula mati: *baula mati* means sandy soil. This soil has a high percolation rate and remains loose even in dry conditions. Less water demanding crops grow well on land with this type of soil. Some *vita jomi* has this type of soil.

***Jawi mati*:** *Jawi mati* is loamy soil. The term *jawi* is a local term for *doas,* the standard Bengali term. Some young and educated persons refer to loamy soil as *doas mati*. But experienced or less educated farmers call it *jawi mati*. According to local farmers *jawi mati* becomes *jhorjhore* (loose) when dry after cultivation. It is easy to plough when moist but hard to plough when dry. They have different forms of this *jawi mati* such as *baula jawi, chitka jawi, khora jawi*, etc. on the basis of physical properties or stickiness. *Baula jawi* is easy to cultivate in both dry and wet conditions, not becoming sticky in either conditions. *Chitka jawi* is difficult to cultivate when it is dry. It needs sufficient moisture to cultivate, and becomes sticky in wet conditions. However,

Figure 5.3

Indigenous soil categories of Ujankhalsi village



according to farmers, this it is easily removed from tools or skin with water. *Khora jawi mati* is not sticky in wet condition rather it becomes dry quickly when this soil is broken for sowing seeds. Farmers relate this condition to 'human skin without oil in the winter season'. It requires more water than *baula jawi or chitka jawi mati.*

***Chitka mati*:** *Chitka* means sticky so *chitka mati* is sticky soil. It is hard when dry. A large hard pan forms when floodwaters retreat which is difficult to break up. In wet conditions it is easy to cultivate but sticky, its clayey nature makes it difficult to remove from both plough and skin. It retains water, which infiltrates it slowly. This type of soil is found inside the *beel* area and paddy grows well on it. Farmers also use another term, *metel,* for this type of soil. They appeared to use both terms *chitka* or *metel mati* for soil, which appeared to me similar. But later, when I raised the question of my difficulty in understanding the use of these two terms, one farmer explained that these two soils are almost the same, but have slight differences. Both are very hard in dry conditions. The soil cracks and forms large hard *dhe*l (soil clods). When *dhel* is watered it softens. The *metel mati* then becomes like *mom* (wax) and mixes well with other soils, but *chitka* soil does not become as soft; instead it turns into *gilta gilta* (small, sticky granules). After a few days though, it does soften. The fertility of this soil is good. Farmers find both *mati* suitable for paddy transplantation.

Goda mati: Farmers call black granular soil as *goda mati.* It is found at the bottom side of the *beel.* The granules are soft and easily break up when pressed with the thumb. *Chitka-goda mati* is a subtype of *goda mati,* which is sticky with small granules. These granules break easily.

Voshka mati: *Voshka mati* is a soil, which is spongy in nature and found at the bottom of the *beel*. This soil has a 'humic' smell. Most of the year, this soil remains under water. It is suitable for local *boro* paddy during the dry season. Farmers do not need to plough in order to transplant paddy here.

Bojboje mati: *Bojboje mati* is also found at the very bottom of the *beel* area. It is spongy too and has strong 'humus' smell and it is not possible to cultivate it because the plough cattle would sink into it. Farmers rarely grow any crops in this soil.

Table 5.1 illustrates different kinds of land, its corresponding soil type and suitability for crops plots in different seasons. The taxonomic classification of these land types, prescribed by FAO (1988), is given in the parentheses inn the first column. From this table it can be seen that farmers consider its distinctive features when describing a land or soil. Some soils fall under specific categories with significant visible properties. Each category is suitable for some specific crop and farmers choose which crops to cultivate according to how they suit respective soils.

The above table presents the general view of local people. However, people do not always follow the above 'rules' when making their cropping decisions. Farmers from the poorer category sometimes grow *aus* paddy on *aman bhuin* in the hope that if the flood depth does not go too high or if it comes late[1], they can harvest their *aus* paddy.

I observed several such plots where farmers faced the loss of their crops. For example, once I found two plots situated side by side where farmers had cultivated *aus* paddy.

[1] After the implementation of FCDI project, people believe that the flood depth and duration is less than past and with this understanding, sometimes they make their cropping decisions.

Table 5.1 Local land and soil categories with their suitability of cropping.

Indigenous land category	Sub-division (if any)	Soil type	flood depth and duration	Main use and no. of crop/yr	Suitability of cropping	Irrigation requirement
Vita bhuin (Dystric Gleysols[2])		*Jawi , khora Jawi* (loamy clayey loam)	Flood free ,(if floded 3-4 days duration)	Homestead, gardening, cropping (3crops)	Banana, Papaya, Wheat, Chilli, Onion, Mustard, diff. Vegetables, ,etc.	Depends on crop (in case of wheat 1-2 *irri.* round the crop period).
Danga bhuin (Dystric Gleysols)		*Jawi* (loamy)	Rarely flood (mainly by rain water0	Suitable for *Aus* paddy	*Aus* paddy, onion, mustard, jute, sesame, potato, wheat, etc.	Depends on crop (for of onion, once in each week; potato, wheat or HYV mustard one or two irrigation during hole crop period)
Kandor (Dystric Gleysols)		As above	Flooded due to rain water. 2-3' depth, 20-30 days duration	Suitable for *Aus* paddy	*Aus ,Jute*, Wheat, Onion , Potato, Mustard.	As above
Aus bhuin (Eutric Gleysols)	*shany bhuin*	As above	Flooded by flood water , 3-4' depth, 60-70 days duration	As above	Seed bed, *Aus* paddy (*shany*), wheat, onion, Jute, HYV boro paddy.	depends on crop: (for HYV *boro* paddy at least twice a week)
As above	*gobra bhuin*	*Chitka jawi* (clayey loamy) , *chitka*	Flooded by Floodwater; 4-5' depth ; 80-90 days duration	Local *Aus* paddy	*Aus*, Jute, HYV *boro*, Sesame, etc.	As above
Aman bhuini (Eutric Gleysols)	*Beel kanda / digha bhuin*	*Chitka* or *metel* (Clayey)	Flooded by floodwater 5-7' depth and duration 90-110 days	HYV *boro* Paddy or summer Onion	local B-*aman* paddy, HYV *boro*, Jute, Onion	Depends on crop (for of Onion,16-20 irrigation round the cropping period)
As above	*soli bhuin*	As above	Flood depth 6-7' 120-130 days duration	HYV *boro* paddy	Local broadcast *aman* paddy (*soli* cultivar) , HYV *boro* paddy,	As above
As above	*Beel-er bhuin*	*Chitka*, slight *Goda* (clayey, granular)	Semi permanent water body; Depth 10- 16' and duration 120 -180 days	HYV *boro* paddy	Deepwater *aman* and HYV *boro* paddy	Fore of HYV *boro*, 6-8 irrigation in the crop period.
As above	*Beel-er laycha* or *Laycha*	Less *chitka* but *goda* (less clayey but more granular)	semi-permanent water body, depth 12-18' and duration 150-200 days	As above	As above	As above
Beel-er thail (Sapric Histosols)		*Voshka-goda* or *voshka voshka- goda goda* (granular and spongy)	More or less permanent water body	Fishery and local *boro* paddy	Local *boro* paddy	No irrigation required

The same variety (*shany*) was cultivated at the same time but the growth was visibly unequal. The plot on the lower land, towards the *beel* centre, showed sparser, poorer growth. Atiq, a farmer, explained that the lower plot is *aman bhuin* and has *chitka mati*, while the upper plot is *aus bhuin* and contains *khora jawi mati*. The *jawi mati* is

[2] This classification is on the basis of FAO (1988).

suitable for *aus* paddy because it remains loose in dry conditions so facilitating crop growth, whereas *chitka mati* is hard and prohibits growth of that crop in the dry season. But the *chitka mati* is inherently more fertile. When the monsoon begins, the *aus* paddy on the upper land may continue to grow and keep up with the floodwater, whereas that on the lower land, may not do so and so be damaged. On the other hand deepwater *aman* paddy has special adaptability by which they can thrive well with *chitka mati* and when floodwater comes they can keep up with it.

Here farmers know *aus* paddy is not suitable for *aman bhuin*, yet, sometimes, they cultivate it on there. Poorer farmers need food grain for their subsistence. When they get the chance to grow any crop, they try to do so. This is the behavioural aspect of the local people. They can recognise the unsuitability of growing a particular crop on a plot, however, their needs force them to break this 'rules of knowledge'. The following two examples illustrate further the difference between what ideally should be done and what actually done when farmers made cropping decisions. This is the 'operational reality' and it varies from their cognition. However, this cognitive perception directs them to make another choice.

Sometimes farmers favour some plots and they take special care when tending them. They may have better plots from the fertility point of view. However, they may have a different attitude towards such plots. They grow preferred crops on those plots. Atahar, a farmer, has a plot of four (4) decimal in *danga bhuin*. The soil is not good (*khaistha*) for cultivating onion there. However, he used to grow onions every *boro* season. He explained the reason:

> "I am a poor man. I bought this piece two years ago. To buy this, I had to sell my cow, goats and my wife took a loan from NGO. This our own land! I have no other land of my own where I can grow onions. So I grow onions here."

Yeasin, a small farmer, has one plot of eight decimals from his father-in-law. His wife has a special interest in this plot. Although they have other plots, she often seeks information about suitable crops for this land. She insists on her husband growing *kodom*s (onion seed plants) there in the dry season although this plot is not ideal for *kodom* cultivation. They need to manage their own seed and to sell the surplus. She also keeps household waste separate for composting on that plot. Yeasin endeavours to grow *kodom* there.

From the above two examples we find that although those plots were not ideal for the chosen crops, however, they grew them there. People's sentiments and needs influence them in making these decisions. This deviates from the farmers' 'rules of knowledge' to 'rules of action'. Atahar has no other land of his own to grow onion whereas he needs to grow that crop. He may find some other sharecropping plots to grow it, but as it was his own plot, he felt a sentiment of 'ownership', and grew this crop there, even though it was not very suitable. Similarly, Yeasin's wife was sentimental about that plot as she had inherited it from her father. So she insisted on her husband growing her expected crop. It not only emphasises the importance of a particular plot to them, but also it makes clear their attitude towards it. Therefore, it has a great social value and, of course, has a rational economic base, which shows their thinking towards their livelihood pattern.

Farmers may have the knowledge of correct procedure but when he / she wishes to take it, it may not be possible to comply due to certain constraints. However, this perceived-knowledge defines his or her decision-making criteria. Guillet *et al.* (1995) examines the mental rules and values of Peruvian farmers and compares them with their actual

behaviour in making cropping decisions. In understanding agricultural decision-making processes, it is important to know to what extent these cognitive and behavioural relationships interplay.

5.3 FARMERS' PERCEPTIONS ON SOIL- PLANT RELATIONSHIPS

This section discusses farmers' knowledge of the suitability for crops in particular soils. A number of studies have indicated how farmers use different soils for cultivating different crops (Netting, 1968; Talawar, 1991; Osunade, 1992; Adegbidi *et.al*, 1999). Tanzanian farmers use both natural and secondary vegetation to identify soil fertility (Ravnborg, 1990). Osunade (1992) reports that when Nigerian farmers were asked to identify soils suited to different crops, they pointed to the appropriate soil without any hesitation. Zambian farmers treat cassava crop as a 'greedy' crop, which makes the soil 'tired' and they manage plots differently when the previous crop was cassava (Sikana, 1994). Atacora farmers of Benin, think shea-tree and cashew-trees are good for soil quality. They also grow beans to improve soil fertility and to control *Striga*, a harmful weed that grows near the root of sorghum and reduces yield (Adegbidi *et al.,* 1999). This section examines what knowledge farmers have about soil–plant relationships and how they use this knowledge for selecting crops for their farm.

The farmers of Ujankhalsi use certain plants as indicators of soil fertility. When farmers find a plot with small patches of weed here and there and some barren patches, they say that the *shokti* (fertility) of the plot is not uniform. The barren areas are not healthy. To manage this land, they cultivate it thoroughly mixing the different types of soil together. They also transfer soil from 'healthy' places to 'non-healthy' places or

put more fertiliser on the poor soil if they think it is necessary. If the farmers find *Bhadla ghas* (*Cyperus* sp.) abundantly on their land, in the wet season, they believe that the soil is *durbol* (weak). Certain plants, like *Lucas cephalotes*, *Chenopodium album* and *Crotolaria juncea* grow well in poor dry soil in the *vita* or *aus bhuin* area. When they identify that the soil has become weak, they adopt necessary measures to recover its ferility. Netting (1962) reports similar observation among the Kofyar farmers of Nigeria. They measure the fertility status of the soil by the height of growth of a common grass known as *togos*.

Aubergine is a cash crop in the village. Farmers cultivate it on their *vita bhuin*. However, *Orobranche*, a notorious root parasite of the aubergine plant flourishes on some *vita bhuin*. Farmers try to avoid the plots where the parasite grows. However, poor farmers have less choice due to lack of enough *vita bhuin*. They minimise the problem by hand weeding, when they find any emerging seedling of the parasite.

Farmers think that some crops require more nutrients. These crops are considered to make the soil *durbol* (weak). After cropping them, farmers maintain the soil by following with a less demanding crops or allowing the land to remain fallow for the next season so as to gain *shokti*. Sometimes the farmers' ideas do not match with those of the scientists. Once I was working with a soil scientist, he pointed out paddy seedlings on a plot, and stated that the land was not suitable for paddy cultivation because of the poor soil quality. I observed that farmers grew paddy on the same plot in the next year. When I asked the reasons and the farmer said:

> "..this plot is *aus bhuin* and local *aus* paddy grows better than other crops in *aus* season. I use the *shany* variety of *aus* paddy, because it requires much *less shokti* to grow. I don't need to use any extra fertiliser on this crop. *The shokti* of *baner pani* (flood water) is sufficient to grow this paddy"

On another day the scientist saw a farmer growing onion on clayey hard soil (*beel kandari bhuin*). According to him, this soil was not suitable for onions, which prefer loose, loamy soil. He raised this point with the farmer. In response, the farmer said that he had no problem in growing onions there, maintaining that the production rate was better than on loose soil. They are getting more advantage from this onion. Onions grown on loose soil lose more weight when stored before sale, than onions grown on clayey soil. For example, he mentioned that if they store onions of *jawi* and *chitka mati*, the onion from *jawi mati* will lose at least 8 kg out of 40 kg (one *mound*) whereas onions from *chitka mati* will lose not more than 5 kg. According to the farmer, the sub-surface of this plot allows water to percolate quickly. In the dry season, HYV paddy requires a large amount of irrigation water to grow properly. To grow paddy here, the farmer would need to supply water daily, which is impossible to get from the irrigation scheme, as it would be expensive and not profitable. Whereas onion needs irrigation only once a week. So, according to the farmer, the plot was more suitable for growing onion than paddy. Moreover market values of crops dictate what decisions the farmers make.

Farmers through their experience, know which crop grows well where, but scientists possess little practical knowledge about this. From the above two examples, it can be seen that farmers' knowledge about their soil mis-matched with scientist's idea. On the basis of their knowledge farmers make decisions about which crop should be cultivated on which particular plot. Researchers with a scientific background tend to confine themselves to their theoretical knowledge which sometimes proves less relevant in the context (Talawar and Rhoades, 1998; Sillitoe, 1998b). They also try to impose their ideas from their position of 'what to do' instead of understanding 'how to do' and

'why'. So it is necessary to know how local people identify their soils and how they apply their knowledge in making farming decisions.

5.3.1 Soil *Rosh* and *Ju*

This section discusses how farmers evaluate the soil moisture content in making cropping decisions.

***Rosh*:** In Bengali '*rosh*' means '*sap*' i.e. '*rosh*' of soil means its moisture content. At first, I thought this term to me referring to the moisture content of soil, but gradually I came to realise that it not just water content. Tajimuddin, a farmer, enlightened me as the following example shows. I had a kitchen garden in front of my field house where I grew some vegetables. I also prepared some tubs. I did not use inorganic fertiliser instead I prepared the soil by mixing garden soil with 'healthy' soil collected from the bottom of the *beel* (for details see next section of this Chapter). Into the tubs, I put only the *beel*-soil. I cared for all the crops equally. However, the growth of the tub-plants was not good, they were thin but gardens plants were healthy. Tajimuddin explained:

> "...bhai (brother) looked at your crops. The growth of *patil*-plants (tub -plants) is weak. This is due the lack of *rosh*. If *rosh* is just water, you are watering regularly then why are these plants weak? There is something within soils, which needs an *poribesh* (environment) to work with; this is *rosh*. You mixed *sari mati* (healthy soil) with garden *mati*. These two *mati* mixed together and work properly. For that reason crop the growth is good there. But in *patil* (tubs), you just picked up soils and put those in the *patil* (tubs), which lost its surroundings and cannot work properly. So *rosh* is not just water, it is more this"

According to them during the dry season the *rosh* gradually decreases but before oneset of the monsoon, it begins to increase. If there is less *rosh* in the soil, plants become weak. From the above explanation, it seems that *rosh*, for the farmers, means more

than just the moisture in the soil, which allows some specific activities to occur within the soil. For biological and chemical activities to take place within soil and plant a suitable *poribesh is needed.* Without this *poribesh* microbes cannot work properly to decompose the debris and for other chemical reactions cannot takes place within the soil, which allow plants to obtain nutrition and to continue their normal biological activities. So farmers use the term soil *rosh* in wider context than just 'moisture content' of the soil.

From their experience, farmers have an intimate knowledge about this complex ecology of their land and can take measures for their proper management. They also know which plant can grow well where and when. On the basis of these ideas, they select suitable crops for their land.

Ju: *Ju* is another term used by Ujankhalsi farmers to mean a soil's adequate moisture to enable them to perform particular activities efficiently, e.g. ploughing, seed showing, transplanting of crops seedlings, etc. I observed that in case of ploughing, farmers could plough their land any time when there is enough moisture but they do not do this. It depends on the nature of work they want to perform. Different crops need different *ju* (Figure 5.4). For example, when farmers plan to prepare land for mustard, lentil or jute, the *ju* in the soil should be as such as it becomes loose after ploughing. If there is excessive moisture, which may enhance the emergence of soil pans, farmers will not plough land at that time because it would be difficult for them to make it loose and the crop cannot grow properly. On the other hand, if the farmers want to prepare their land to transplant paddy, they needs wet soil to make it muddy for transplantation. Here *ju* is soil's wet condition. In case of broadcasting of crop seeds

the required *ju* is different for each crop. For example, the required *ju* of mustard seeds is different from lentil or jute, although their ploughing *ju* is almost similar. If the moisture is more or less than required, it will prohibit optimum germination of seeds. So farmers keep a close eye on the *ju* of the soil to undertake their respective activity. By touching the soil they can presume the extent of *ju* within the soil. If the *ju* is not suitable for a crop, farmers will not cultivate it in that season. So they have to seek a second crop to fit that plot at that time, or else leave the land fallow for that season.

(a)

(b)

Figure 5.4 *Ju* (soil moisture) for different crops (a) *Ju* for wheat crop and (b) *Ju* for HYV paddy crop.

From the above discussion it is found that Ujankhalsi farmers possess profound knowledge of soil-plant relationships and this knowledge allows them to make their cropping decisions.

5.4 FARMERS' PERCEPTIONS ON SOIL FERTILITY

This section deals with farmers' perceptions of soil fertility and their management practices, which influence their cropping decisions. Some ethnographic reports show that the ideas of farmer of soil fertility and its maintenance differ from that of the scientists. According to them local farmers consider soil fertility as a dynamic characteristic and quality falls through a number of factors such as extensive use of fertilisers, type of crops grown, water quality, etc (Williams and Ortiz-Soloro, 1981; Sillitoe, 1996a; Sillitoe and Shiel, 1999). Farmers of Korobo district of Northern Sudan used the terms fertile soils as 'blessed' soils, which are 'soft'. They correlate soil fertility, also, to soil moisture (Amnor, 1991). To farmers of Ujankhalsi, fertility of soil means *shokti* of soil. It is not only the soil textural qualities or chemical aspects in the soil to them it is the 'power' of the soil.

Farmers assess fertility levels, in a particular soil, by observing crop performance, which is influenced by several factors. Among these factors, soil structure, previous use of that soil, nature of *poli* (silt) deposition, availability of water, seasonality, cultivation-age of a plot, etc. Their perception is multi-dimensional in nature. On the other hand, soil scientists generally consider nutrient status of soil to be apart from other issues (i.e. one-dimensional) . They carry out tests on soil fertility to identify the deficiency of soil nutrients so that these can be rectified either by applying fertilisers or by some other means.

In Ujankhalsi not all lands are situated at the same elevation and so do not suit the same type of crops. Even where one plot has a varying elevation and different soil types, farmers intelligently distinguish these micro differences and choose crops which are fitted to the specific area of the plot. They know different crops need different amount of nutrients. They observe the performance of crops and interpret the *shokti* of the plots in relation to the respective crops. When any crop does not attain the desired growth or has excessive growth, farmers become aware that the *shokti* of that plot is not suitably for certain cultivated crops.

Therefore, some soils are only suitable for some crops and have good *shokti* in respect to those crops but not for other crops. For example, papaya, *potol* (a Cucurbit), banana and aubergine, farmers consider *baula jawi* or *jawi mati* as suitable for these crops but less 'healthy' for HYV paddy. These crops do not tolerate a water logged state. This is a healthy soil for these crops because of its water permeability not soley for nutrient content. For HYV paddy cultivation, *chitka* or *goda mati* is suitable. This is because its water retaining capacity is higher than that of *baula jawi* or *jawi mati*. Moreover its gets silt every year due to flooding, which enhances its nutrient status. They know HYV paddy requires more fertiliser than traditional varieties to grow. However they do not grow these HYV varieties on very humic soil (peat soil) such as *voshka goda* or *voshka mati* because it becomes *jhapano* (large vegetative growth) affecting grain production but they grow traditional variety there, which yields well. Therefore, to farmers, the *shokti* of these soils is not good for HYV paddy but suitable for traditional *boro* variety. So they rate *shokti* of different soils according to their productive capacity of particular crops and arrange suitable crops by taking the advantages of this soil variability.

A problem census conducted by natural scientists revealed that farmers think 'declining soil fertility' is the second most important problem for them. Farmers know that inappropriate soil management exacerbates soil degradation. Over exploitation or intensive use of soil due to population pressure, insufficient application of organic manure along with excessive use of inorganic fertilisers and fuel shortage leading to use of organic matter for fuel are the major causes of declining soil fertility (Box 5.1).

From this interview, it can be seen that farmers think population pressure has caused over exploitation of soils with constant cropping and due to this the soil in this area is getting poorer. Due to the fuel shortage and decreasing numbers of cattle and goats, farmers are unable to make all the compost they need to manage their soil. When I discussed this with other farmers it seemed that fuel shortage was acute among poorer families. Wealthier families have other sources of fuel such as wood, straw, etc.

They still use *gobor* (cow dung) for composting and use this on their soil. Poorer families have little opportunity to make compost. Therefore, they have to depend on inorganic fertilisers, which are costly for them. Thus the soil quality degrades due to lack of organic matter. They increase the use of inorganic fertilisers, which has two damaging effects. One is that soil degradation occurs more rapidly which decreases soil productivity and the other is how to pay for the fertiliser. To purchase fertilisers, they have either to borrow from moneylenders or from credit schemes (e.g. loan from NGOs) or they have to purchase fertilisers on credit and pay higher prices to the retailers (see Chapter 8). Therefore, purchasing fertilisers can result in farmers being sucked into a 'loan cycle'. They are trapped increasing their poverty. Steiner (1998) found among Rwanda farmers that insufficient manure and declining soil fertility arose

Box 5.1

Nazrul, 62, lives with his wife and two children. Besides being a sharecropper, he is a day labourer. He recalls that "..When I was young, the population was smaller and we did not need to cultivate so much land for our subsistence. At that time we grew only rainfed paddy in the upper region of the *beel* . We grew vegetables, wheat, and other cash crops on the *danga jomi.* At that time we did not use any extra fertilisers or pesticides and used *paosh* (compost) to manage our *mati* (soil). Now the population has increased more than three times and we are also cultivating new crops but they fail to meet our needs. These crops do not grow without fertilisers. Now we are cultivating our lands as best we can and are not allowing soils to rest 'to get them repaired'.

.. As far I can remember, *irri dhan* (HYV paddy) came in this area just after liberation (1971). During this period, we heard that this paddy would eliminate our food shortage and so we started to grow it. First the government subsidised seeds, fertilisers and *bish* (pesticide) but this was withdrawn after a few years. We have been cultivating this *dhan* (paddy) since then and all the time we are using *sar* (inorganic fertilisers) at increasing rates and new types of *bish.* These are damaging our *mati.* Now you find few earthworms and frogs in the crop fields. You know, earthworms help us to decompose straw and grasses in the soil and frogs catch harmful insects from our crop fields.

...Eight to ten years ago, we had plenty of cattle and goats. At that time we also had many trees and there was no fuel shortage. We used most of the cow dung as compost. Now we are too many people, most of our trees have vanished and we are facing a fuel crisis. We are using *gobor* (cow dung) as fuel only a small portion remains for making *paosh* (compost). So we are now depend on *sar* (inorganic fertilisers). These *sar* and *bish* (pesticides) also pollute the water of the *beel* during the dry season causing fish diseases (infection on the body of fish) and ultimately decreases fish species. We are lucky that every year the flood comes and washes away these *bish* (harmful materials) from the soil and deposits silt on the land, otherwise our soils would turn like *bish.*

...When I was young or even a few years ago, we used to have some people coming into this area to herd pigs. They used to fodder their pigs on some plots for couple of days and the pigs turned over the *mati* when they searched for their food. This opened the *mati* exposing it to *alo batas* (light and air), which ultimately increses makes it healthy. Their droppings on the plot also increased the *shokti* as well. Now we are cultivating crops at all year round, so there remains little fallow land where pigs may be herded. Moreover, we are Muslim and, with time, we are becoming more religious-minded. To Muslims, the pig is *haram* (prohibited) so we don't like to see pigs. People prohibited herders from coming to this area.

from small farm sizes and poverty. In Ujankhalsi, declining soil fertility is common to all farmers but by manuring, wealthier farmers can maintain their land better than the poorer farmers.

Farmers often use metaphors to describe some soils. The term '*jora*' means sick. *Jora mati* is sick soil which cannot be made healthy. *Mada mati* (unhealthy soil) is that on

which crops only grow with the addition of of fertilisers. *Rakhasi mati* (demon like soil) is soil which needs a large inputs of fertilisers to grow crops there. Every time that soil requires a large amount of fertiliser, farmers think that the fertiliser may leach out from this soil and so damage it. *Nosto mati* (damaged or ruined soil) is soil that was healthy, but due to inappropriate management or over exploitation has become unhealthy (*nosto*). It is possible to make it healthy again by proper management. *Pagla mati* is a soil that is 'mad' (*pagol*). It is difficult to predict the *shokti* (fertility) of this soil. In some years it yields a good crop, but in others crop growth is bad. Crops on this soil need careful management.

Some researchers have reported the symbolic naming of soils. Weinstock (1984) describes 'hot' and 'cool' soil based on the fertility rather than the actual sub-surface temperature of soil. Sikana (1994) describes the perceptions of Zambian farmers that soil is 'thirsty' if well drained and 'weak' if not fertile and it gets 'mad' or 'tired' if it is cultivated continuously without fallowing. Kurin (1983) describes that farmers of the Indus basin prefer to cultivate wheat on 'cool' and 'dry' (light textured) soil. My opinion is that this symbolic naming of Ujankhalsi farmers signifies that they are aware about the soil quality and its nature in their plots. This perception allows them to select a suitable crop for the respective plot and can employ proper management practices when necessary.

5.4.1 Soil Management Practices

Most of the studies about soil indigenous knowledge describe local soil classification and its relation to scientific classification (Marten and Vityken, 1986; Osunade, 1987; Habarurema and Steiner, 1997; Steiner, 1998). Few researchers have placed emphasis

on how local people dynamically manage their soil on a sustainable basis (Alcorn, 1989; Sillitoe, 1996a). So far in this chapter I discussed farmers' perceptions of soil-plant relationships and soil fertility. This section deals with how farmers use their knowledge in managing their soil in obtaining their livelihood from it. During discussions, farmers mentioned a number of processes and actions, which they knew, will influence soil fertility.

Farmers are aware that management has to be adapted to the type of land, its quality of soil and the crops to be grown there. For example *baula* or *jawi mati* (sandy or loamy soil) needs to be treated differently from *chitka* or *goda mati*. They also consider which crops to grow given their different nutrient demands. For example, requirements of jute or paddy are different and even different cultivars of paddy thrive on different soils. *Vita jomi* or *danga bhuin* is almost flood free land which receive very little silt to sustain its fertility. These lands require more care than those which get silt deposits every year from the floods. Moreover, farmers produce crops year round on these higher lands. Farmers are aware of their soils' productivity and so pay particular attention to the management of this soil. I observed the following management practices to be commonly adopted by local farmers:

5.4.1.1 Inorganic Management

Use of inorganic fertilisers is common among Ujankhalsi farmers. They normally use urea for nitrogen, potash and triple or single super phosphate (TSP or SSP) to prepare their land for cropping at a rate of 2:1:1. They use 1:1:1, as urea, potash and phosphate, respectively for root crops. They also use urea as a top dressing when crops required it. These are the standard doses prescribed by extension workers. However, very few

farmers maintain these doses. They understand that urea facilitates vegetative growth, phosphate makes plants stronger and potash facilitates more root growth. They use these *sar* in different doses perceiving the fertility status of the respective plot and depending on the type of crop to grow. Recently, farmers started to use DAP (di-amoniaum phosphate) for nitrogen and phosphate, which they think as a mild and effective fertiliser. As the price of this fertiliser is higher than others, few poor farmers use it.

There exist some conflicting ideas between farmers and extension officers regarding the use of some inorganic elements in their crop management. Some farmers of Ujankhalsi village, over the last four / five years, are using *lobon* (cooking salt--sodium chloride) during cultivation on their HYV paddy in the dry season. The crop grows well with a good yield. In another case farmers use 'boric powder' in managing some of their specific crops such as papaya. For example,

> "..once in my kitchen garden some papaya plants were affected by what I thought was a viral disease and I pulled out some of the affected plants and buried them. However, Tajimuddin, a farmer, suggested to me to use boric powder on the soil which might remove the symptoms. He showed me his healthy papaya garden where he used boric powder whenever he found the evidence of this disease. When I used boric powder, my papaya plants soon recovered."

I discussed the matter with the local Agriculture Officer, he said that boric powder contains some boron and soil of this area is deficient in this element. So farmers may get good result from boric powder, whereas the use of sodium chloride could have a negative impact. According to him, plants need sodium at a very low rate, which is present in the soil and there is no need to add any extra. Even so, some farmers have been using it and getting a good yield every year since the last four / five years without getting any adverse effect.

The environments of scientists and farmers are different. Scientists are more concerned about their laboratory tests results, soil chemistry and plant physiology. Their theoritical knowledge allows them to make predictions. Although they have some practical knowledge under controlled environments; they have scant knowledge about the outcome of these findings in open environment such as *beel* areas, where many of factors interact with each other in maintaining the whole ecosystem. Farmers are the experimentors of this open environment and on the basis of their results, they are making decisions for growing crops and managing their land.

5.4.1.2 Organic Management

Composts and ash: During the dry season most farmers in the village use *paosh* (compost) on their land prior to planting the crops (Figure 5.5a). The *paosh* comprises cattle dung and homestead waste. Every household has a compost pit where it prepares compost. To compensate for the cow dung shortage, farmers are now using *batraj* (water hyacinth) as the raw material of compost.

During the winter, when the floodwaters begin to recede, farmers collect this weed and compost it. The agricultural extension services are also providing technical assistance to improve this compost preparation. Some crops are sensitive to high temperature (e.g. Bitter gourd, Cucumber, pointed gourd) and farmers use straw (*khor*) or dry water hyacinth (*Batraj*) plants to cover the soil and protect their crops from excessive heat. After harvesting the crop, they mix the debris into the soil so as to increase its *shokti*. Farmers also use oil cakes on their fields. Cakes from mustard or rapeseeds and *neem* seeds (seeds of *Azadricta indica*) are popular with farmers in this area. They use *chai* (ash) from paddy straw on onion plots to protect the plants from insects and increase

soil fertility. To prepare paddy seedbeds, farmers use ash on the bed, which helps to protect seeds from insects and makes it easier to pull seedlings out from the bed (Figure 5.5b).

(a)

(b)

Figure 5.5 Soil management by organic amendments (a) Farmer uses composts in the soil and (b) Farmer uses ash on the soil

Green Manuring: On some low land particularly on *danga bhuin* and *aus bhuin*, farmers plant the *Dhanche* plant (*Sesbenia* sp.) from which they prepare green manure. They sow it during the pre monsoon and in the early monsoon, and when the plants

have grown 2 to 3 feet high, they chop them up and mix them with the soil and leave the plot for 20 to 30 days before growing their next crop -- usually 'HYV *aman* paddy'.

Crop rotation: As I mentioned earlier, farmers believe that certain crops are better adapted to certain soil types than the others and, consequently, farmers choose their crops according to the soil type. The typical crop rotation of different land is given in the Appendix II. For example, onion is a nutrient demanding crop and farmers have to use large amount of fertilisers to manage this crop. After harvesting onion, farmers grow jute on those plots in the *aus* season which does not require the addition of more fertilisers and this practice also keeps soil healthy. The reason farmers explained,

> "..we use huge *sar* (fertiliser) on onion plots, a part of this *sar* remains in the soil on which jute grows well. We don't need to put any extra *sar* on this crop. The fallen leaves of jute increase *shokti* and its roots keep soil loose which is helpful for the next onion crop. If we will grow paddy after onion, the next crop after this paddy will not grow well and we need to put more *sar* to obtain a good harvest."

With this knowledge, on some plots farmers grow *aus* paddy instead of jute where they previously grew onion. There are two reasons for this choice; one is the market value of jute fibre is low and the other is farmers need paddy for their subsistence. Poorer farmers are keen to grow more *aus* paddy instead of jute. Although they were aware of the advantage of this crop rotation, they fail to implement it. From my experience, I understand that both onion and paddy extract nutrients from the same zone of the soil, which may adversely affect soil fertility. On the other hand jute takes *shokti* from the deeper region of the soil. This crop cycle allows soil to repair its nutrients status in the both zones and so as a result the next crop grows well there, a sustainable soil management practice.

Here if we compare the 'cognitive rules' with behavioural rules in regards to the above crop rotation and soil management, we can see that farmers conceive what they should do. However, if they cannot implement their preferred choice, they are go for an alternative one. This from the usual practice is important in understanding farmers' decision-making process.

Another crop rotation is paddy followed by lentil or *khesari* (pea). They harvest these pulses by cutting the lower portion of the stem leaving the roots in the soil. Extension workers introduced this harvesting method. Before this, farmers used to harvest by pulling out the whole plant. They now believe that the new method enhances the *shokti* quality of soil. Farmers also use mixed cropping in the *chaitally* or *boro* season. Potato with radish or bitter gourd; potato with radish and tomato; cabbage with coriander; radish with amaranth or leafy vegetables; *Potol* (pointed gourd) with banana, etc. This mixed cropping system helps them to meet their daily needs and provides cash for other needs and balances the level of nutrients in the field.

Fallowing: Due to the needs of local people, the fallowing period of land has reduced dramatically. During fallow period farmers take care of their soil in different ways. One of such technique is called *mati bhajano* (sun dried soil). During summer, farmers leave their land fallow for a couple of months, and during this period they plough it and leave it for a couple days for drying. They repeat this procedure with the same piece of land a couple of times to 'fry' (*Bhajano*) their land in the sun. According to farmers, this allows the soil to regain *shokti* and decreases weeds. They say one proverb in this regard:

"Chaita hale uri nash
Baishak-e hobe na ghash"

This means if one cultivates land frequently in the month of *Chaitra* (mid March –mid April), it destroys all *uri* (weed seeds, underground stems or seedlings) and there will be no grass (*ghash*) in the month of *Baishak* (mid April – mid May). *Chaitra* is one of the hottest months of the Bengali year and it is the suitable time to control the weeds by frequent ploughing (*chashe*). The control of weeds by fallowing and ploughing helps to maintain soil fertility.

Soil transfer: Transfer of soil from healthy areas to intensively used areas is a common practice among the farmers of this village. They use this technique mainly on higher land plots (like *vita bhuin* or *danga bhuin*) where they intend to grow cash crops, such as banana, papaya, chilli, winter onion, etc. According to the farmers, the soil at the bottom of the *beel*, or ponds and other low lying areas is more fertile because it contains dead plant materials, and deposited silt. They say that if they mix *sari mati* (healthy soil) with less fertile soil, it helps to increase its *shokti*.

Alteration of land 'shape and size' is also a common feature among the villagers. To cultivate more than one crop in a year, farmers sometimes physically alter the land elevation. There are several *vita bhuin* within the *beel*, which were raised by farmers so as to grow crops there throughout the year. Hakim's vita *bhuin* within Padma *beel* is one of such example. During fieldwork he redressed his land by decreasing its height and expanding the crop growing area. As the plot is situated within the *beel*, it was probably once constructed at a high elevation to protect the crops from flooding. Now the flood depth has decreased due to the embankment along the river side, the farmer does not need such high-elevated land and so he altered his former practice and rearranged the plot. This time he moved soil from one place on the plot to another. He explained:

"the adjacent *gabar* (low land) plot is mine. I thought that if I could make two plots at the same level they would remain flood free and I could cultivate at least three crops a year. So I am planning to make them all the same level."

The soil heterogeneity of a plot is an important consideration of farmers when cultivating crops. Farmers manage this by sub dividing plots according to soil quality and growing appropriate crops adapted to the soil. Plots within a *beel* are not uniform in elevation, the slope increases towards the centre of the *beel*. It is necessary that plots are the same plot-height for equal distribution of irrigation water and better utility of *sar* (fertilisers) and *bish* (pesticides). Farmers are levelling their land by cutting soil off the higher part of a plot and putting it on the lower part. They often subdivide plots by *ail* (soil bunds to demarcate plot). I conducted a survey and found that on the eastern part of the Padma *beel* seventeen (17) plots had been so altered in 1998. For example, two brothers, Nakib and Lutfor, who live separately and take shares separately, own two unequal plots within Padma beel. The lower parts of these plots are suitable only for local *boro* paddy. They first combined the plots into one and changed it by transferring soil from the upper part to the lower part, and after that they divided the plot again into two halves (Figure 5.6). Now both plots are suitable for HYV paddy cultivation.

These examples show that farmers sometimes physically alter the land to grow their desired crops. Therefore, it has an impact on the decisions-making process of farmers. However, this practice may distort the findings of scientists. If the soil scientists take soil samples from a different layer of soil and analyse them and they may establish relationships between the layers, and with these results, they identify better or more suitable plots for crops than the farmers do. In practice, this will not fit the reality of

the soil status because farmers often tend to mix topsoil with subsoil indiscriminately. So these results will have little significance for the farmers as they do not find those plots suitable for the crops prescribed by the agriculturists.

Figure 5.6 Farmers have transferred soil to level the land

Cultural belief and soil management: Farmers of this village believe that to plough the land on '*Purnima*' (a full moon day) or on the '*Amaboshya*' (a day without moon) is harmful for both cattle and land. They say:

Bolod-er ga-e dhore bat
Jodi boa hal Purnumae

It means, if any one ploughs (*chash kora*) his land on the day of Purnima, his ox (*bolod*) will be attacked by arthritis (*bat*). So farmers try to avoid ploughing on the day of *Purnima* and *Amaboshya*. Another belief is that if an ox tries to escape from a plot during ploughing, there might be something wrong with the land and the farmer will not start cultivation on that day. There is a popular saying, which farmers often use to describe these circumstances:

Je bhuin-e hal chere pala-e goru,
Se bhuin –e chash koro na shuru

When ox (*goru*) go away (*chere pala-e*) from the land during the period of ploughing, one should not further start (*shuru*) ploughing on that land (*se bhuin*). The last day of the month of *Poush* (mid-December to mid-January) is the day of the *basto puja* (worship of land). On that day people of the Hindu community do not till their land. They perform a ritual to worship the land. Although all the Ujankhalsi villagers are Muslims, and the worship of anything other than Allah is prohibited, some farmers do not till their land on the day of *basto puja* ritual.

The above examples reflect how the rural people's soil management practices are culturally embedded. To scientists they may have no or only little importance but these illustrate how farmers' belief systems assist them in maintaining their soils and land. Sheil (2001) discusses the potentiality of using religious belief in understanding the past environment. Talawar and Rhoades (1998) have criticised the approach of scientists and emphasised the need for incorporating farmers' cultural values, which direct them in 'action'. This 'action' is the decisions of farmers taken for obtaining their livelihoods.

5.5 CONCLUSION

This chapter illustrates the profound knowledge farmers have about their land and soil. This knowledge is based not only on what they have inherited from their forefathers, but also on their personal experiences in the present day. However, not all farmers are able to apply their best understanding effectively due to several constraints caused by socio-economic differentiation and ecological factors. Poorer farmers suffer most from these with their little land, lack of capital and other necessary resources. Whereas wealthier farmers can manage their land in a better way from their socio-economic positions but their use is a short-term measure, which can cause depletion of soil fertility.

Ford (1990) says that the more diverse the environment and the smaller the farms, the more complex is the farming system. From the above account, it is revealed that floodplain crop-fields are small complex ecological units in which appropriate soil management has to be made. Farmers are well aware of the situation and have developed a complex farming system there. They take advantage of soil and climatic variability when making suitable crop choices in order to maximise yields. By doing this, their cropping decisions sometimes do not fit with the scientists' views. This is because the latter look into the issues from ecological point of view rather than holistically. Farmers make decisions in terms of land use from their personal experiences and to do this they take account of their socio-cultural understanding. So the land-use pattern is as much socio-economic in nature as ecological. This is often ignored by the scientific research.

6. WATER RESOURCES

6.1 INTRODUCTION

The extensive network of large and small rivers is a significant feature of the Bangladesh floodplain and plays a prominent part in the country's hydrologic cycle. The complex hydrology system is based on three major rivers: the Ganges (locally known as the Padma), the Brahamputra (Jamuna) and the Meghna. The monsoon rains and Himalayan snowmelt, which drains through India, are funnelled through Bangladesh. Moreover, being a subtropical country, it receives a total of about 2000 mm rainfall per annum of which more than 80 per cent falls during the monsoon season. All this water helps to swell the rivers and, consequently, flooding occurs across the floodplain every year. The extent of flooding varies from year to year. People can cope with normal flooding but it is abnormal flooding that creates problems for them. They try to manage by changing their normal activities and adopting some special adaptive strategies (Chadwick, 2000; Soussan, 2000).

Being a deltaic country, Bangladesh possesses a massive water resource (Brammer, 1990). People's relationship with it is of practical importance and the management is complex and diverse. They perceive different water bodies differently and access to them also varies. The *beel* is the major and most important water body in floodplain. During the monsoon all lands of the *beel* go under water and in the dry season it

shrinks (Figure 6.1). This interplay of land and water influences people's livelihoods (Chadwick, *et al.*, 1998; Soussan, *et al.*, 1998).

This chapter will discuss how water resources influence floodplain dwellers in making their cropping decisions and what problems and constraints they face in doing so. It, also, examines how different intervention systems, such as the Flood Control and Drainage Scheme (FCD), and the introduction of irrigation facilities in the dry season work in the locality and their consequent impact on people's livelihoods, especially on their cropping decisions.

6.2 WATER BODIES IN THE VILLAGE

There exist different types of water bodies in the village. People perceive them differently as access to them varies. These can be categorised into three groups: i) Closed water bodies, ii) Open water bodies, and iii) Underground water bodies.

6.2.1 Closed Water Bodies

Closed water bodies are those which have been constructed artificially and are bounded by embankments or other means of containment. These are mainly private property (very few are common property) and are inherited according to the law (see Chapter 4, section 4.3). To these water bodies, people only have access for bathing or daily use (not for irrigation or fishing purposes). *Pagar* and *doba, pukur* (ponds) and *dighi* (Tank) come under this category. The villagers also perceive *doba* and *pagar* differently. Both Bengali terms can be translated into English as 'ditch'. A *doba* is normally constructed by removing soil from one place to another for raising land so as

to make it flood free. The raised-lands is mainly used for constructing homesteads. *Doba* is irregularly shaped, normally smaller than a pond and may hold water from five months to 8 months depending on its size and depth. When this *doba* is increased in shape and depth, it may be termed a pond.

Figure 6.1 Map showing the extent of *beel* flooding at different times of the year.

According to local people, *Pagar* is similar to *doba* but it emerges when soil is dug out to construct a road or to raise land for making it suitable for some desired crops but not to construct a homestead. So *pagar* is found near agricultural land rather than in the homestead area. It is difficult to distinguish *pagar* and *doba* by size, but normally *pagar* is smaller than *doba* and retains water for fewer months. How farmers use these water bodies and what impact these have on local agriculture will be discussed.

6.2.1.1 Close Water Bodies and its Relation to Agriculture

Before the introduction of underground irrigation, surface water irrigation was the only means for growing crops in the dry season. Dry season agriculture was limited to those areas where surface water irrigation, by traditional methods, was possible and where farmers could cultivate crops requiring less water, such as wheat and onion. They used closed water bodies like ponds; ditches (*doba*, *pagar*) as sources of water. Farmers used to collect floodwater in their ponds during summer. This is evident from the shape of the ponds in this village (Figire 6.2). Most of the old ponds have a small drain facing the *beel,* which is used to drain water into the pond from the *beel.* There are, however, some ponds within the *beel*, but this is uncommon. People reported that these were constructed to collect *beel* water for irrigation use in summer (Figure 6.2). The owners of these ponds are mainly rich and medium farmers; few small farmers had ponds for irrigation. In earlier times, a few landlords used to pass over their land to poorer farmers for sharecropping for *boro* cultivation because they had little suitable land for growing crops in that season and the cropping decisions were different then than in recent times. It was not possible to grow HYV *boro* paddy because it requires a large volume of water. Poorer farmers were mainly dependant on *doba* and *pagar,* which they had, for water. Farmers still use these water bodies both for irrigation and

fish culture. But decision-making process has changed, because now about 70 per cent of land is under dry season agriculture. The rich can now offer land to sharecroppers, because they are unable to obtain labour themselves. Farmers also use these *doba* and *pagar* to grow seedlings of onion and paddy and to grow winter vegetables. The use of ponds for irrigation is limited now because people are using them for fish culture. This aquaculture is contributing greatly to the rural economy. In Ujankhalsi almost all *pukur* and most *doba* are under aquaculture. The *Pagar* are not suitable for fish culture and so are used for irrigation purposes.

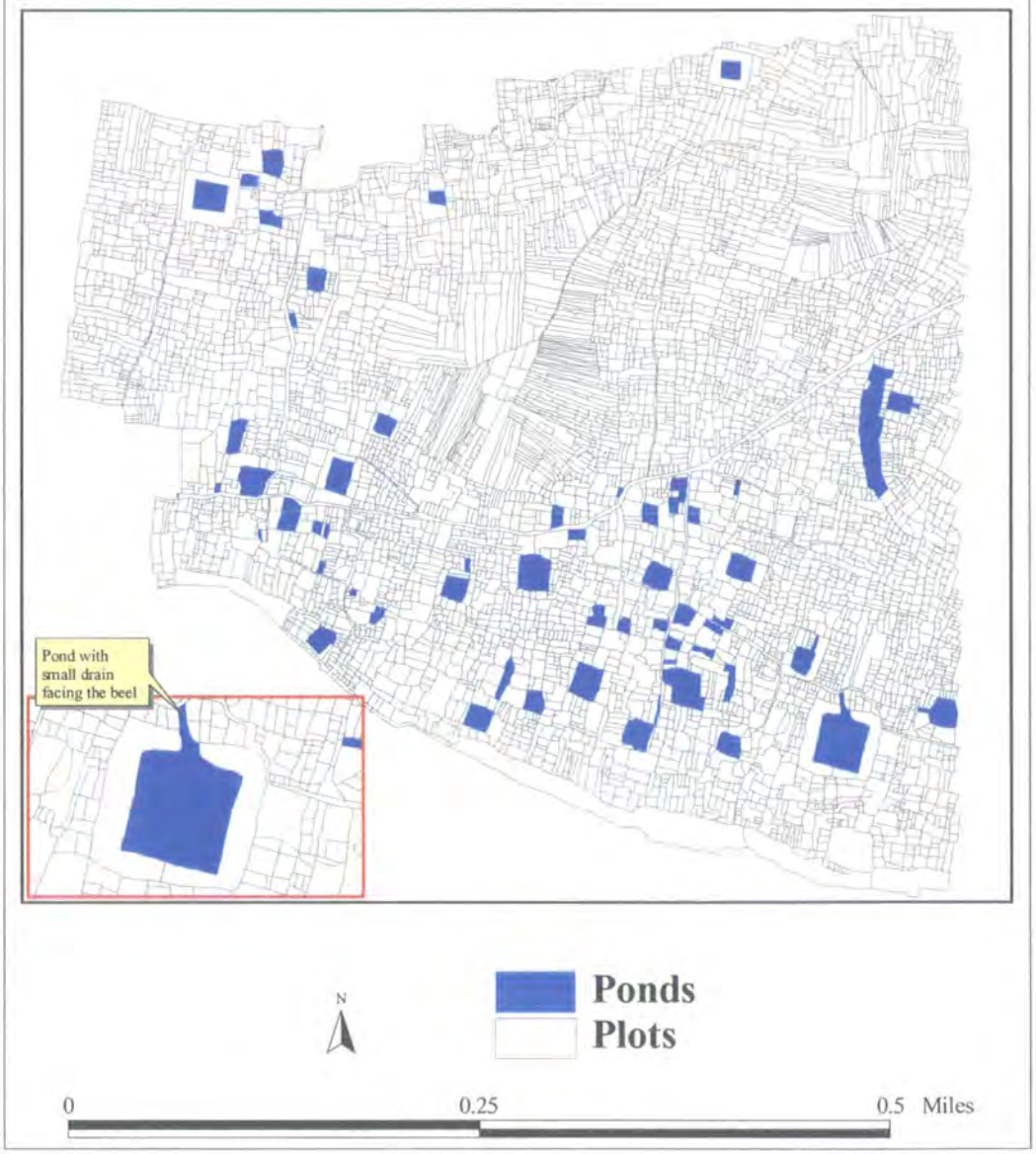
For aquaculture, people prepare their ponds in early summer and culture fish there throughout the rest of the year. They sell their fish before the ponds dry up in summer. The cultivated species are mainly exotic and high yielding. The common ones are: Silver carp (*Hypophihalmic hysmolitri*), Common carp (*Cyprinus carpia*), Grass carp (*Cirrhinus* sp.), Catla (*Catla catla*), Rui (*Labeo ruhita*), African cat fish (*Clarius goriepinus*), Thai swar punthi (*Puntius sarana*), and Talapia (*Tilapia nilotica*).

This fish cultivation has proved economically viable but it does require inputs, which are beyond the reach of poor people. So wealthier families own most of the ponds, having the means to manage them. However, this creates a high demand for labour which, in turn, provides employment for poor people. NGOs are now providing loans for aquaculture to poorer families, who can now lease ponds for fish cultivation.

This aquaculture has an impact on crop management. Those who cultivate fish in ponds make a good income, and with this income, they can manage their crops better. In some cases, their crop choices are different from those who do not cultivate fish. For

example, Lutfor, a youngish (43 years old) medium farmer, has been cultivating fish for the last four years. He has only one acre of land of his own and he is cultivating fish in three ponds, which he has leased for three years. His net annual income is at least 20, 000 *taka*. He is not interested in growing paddy on his small plots because the return from paddy is not good and it requires more care. He cultivates bananas on his

Figure 6.2 Plot based map showing ponds within beel area



high land, which do not require so much labour, so he can tend them within his available time. Although onions are labour intensive, returns are good, so he grows onions in the dry season wherever possible. On the other hand, Jeher, an aged farmer (about 79 years) has the same amount of land, but no aquaculture and he grows paddy, which he needs for his subsistence. So ponds feature significantly in making agricultural decisions.

This is an example of two families with the same amount of cultivable land and it can be seen that the crop planning differs because of other endowments such as ponds, mental map regarding livelihood, etc. Lutfor's intention is to make money by growing cash crops, such as banana or onion, rather than growing subsistence crops, such as paddy or wheat. He can buy the latter from the market, which he thinks is more profitable for him than investing in subsistence crops. On the other hand, Jeher's attitude is first to grow subsistence crops and then cash crops, if possible, because he has no other cash earning opportunity. Moreover, Jeher, being a older farmer, is reluctant to buy his subsistence produce from the market[1], whereas Lutfor is market oriented. He thinks more about profit, and makes decisions accordingly.

6.2.1.2 *Kua* Fishing and Agriculture

A *Kua* is a pit dug in the bottom of the *beel*. It is not possible to grow crops in a *kua* because water remains there all round the year. People dig out a *kua* is to provide shelter there for fish. In the dry season, when the *beel* water goes down to the bottom of the *beel*, people catch fish from there. Normally, the catches are very good (Figure 6.3). The catch also depends on the position of *kua* in the *beel*. People consume the

[1] In Bengali culture, to buy subsistence food like rice or wheat from the market is shameful to a farmer. This means that he is getting poorer and also not an efficient farmer. So most farmers try their best not to buy from the market, although the situation is changing with time.

fish and sell the surplus. According to some *kua* owners, the return is much more than for any crops grown on the same size of land and for that reason sometimes conflicts arise over the use of *kua*.

(a)

(b)

Figure 6.3. Photographs showing kua fishing (a) Drying out the *kua* by pump machine (b) Catching fish after drying out the *kua*.

Normally, *kua* owners do not want fishermen to catch fish over their *kua* during the monsoon because they disturb the shelter for the fish. Fishermen are attracted to such

pits because the catches there are good. By law, when water remains above knee height (approximate 2 feet), the water is 'common property' and any one can fish there. So there is no legal authority to prohibit them from fishing there. However, influential persons, who have a *kua* in the *beel*, try to prevent fishermen from fishing there and harass them by physical or other means. I observed some wealthier, influential persons threatened poor fishermen when they saw them fishing over their *kua*.

Sometimes conflicts arise among *kua* owners during the dry season when the water level drops making it suitable for catching fish there. All *kua* owners watch their *kua* in daytime and sometimes at night (for a couple of days before the expected fishing day). They also put food into their *kua* to attract more fish. Some unscrupulous *kua* owners also disturb others' *kua* before fishing to frighten fish to shelter in their undisturbed *kua*. They do this at night when no one remains in the *beel* area to watch their *kua* or crops. Some people protest to the village elder to seek *bichar* (justice) when they find this incidence has happened in their *kua*.

Conflicts also arise between fishermen and farmers. Farmers are interested in using surface water for irrigation of *boro* paddy. Fishermen do not want farmers to draw water for irrigation reducing it to less than knee height, which means that they will no longer have open access to the *beel*. Another problem for the fishermen is that *kua* owners are able to catch large number of fish from their *kua*, which reduces the stock in the *beel*. On the other hand, *kua* owners, who are normally farmers, encourage other farmers to use water for irrigation to reduce more quickly the water level of the *beel*, so they can fish extensively in the *kua*.

As was mentioned in the methodology section wealthier farmers prevented fishermen from fishing over their *kua*. This dispute centres on the use of the *beel* water (see Chapter 2, section 2.2.6.1). There were several reasons for the conflict. One was *kua* fishing. If wealthier farmers are able to dry out their *kua* in the dry season, not only do they catch all the fish before it dries out, they are able to cultivate crops on the exposed land. Fishermen were interested in the reverse situation because if water remains in the *beel* throughout the year they can fish all year round. Fish stock can remain high enough in the *beel* because it is not possible to catch all the fish from the water. This gives rise to large quantities of fish for the next year, particularly during the monsoon. Poor people were interested in conserving fish in the *beel* to ensure their living throughout the year. The project sided with the fishermen's view as the poorer party and supported digging out the bottom of the *beel* to conserve water and fish in dry season, which seemed more environmentally sustainable.

Wealthier farmers were against this strategy, as they could not cultivate their fallow land during the dry season. The other reason behind this opposition was their interest in *kua* fishing. As I mentioned, the return from *kua* fishing is greater than from crops. *Kua* owners are not interested in sharing this profit with others. It seemed to the farmers that if the project provided help to digging out the bottom of the *beel*, fishing profits would be distributed among all the landowners of the excavated areas. Currently, all landowners do not have *kua* in that area and not all *kua* are suitable for fish to shelter in. The owners of 'profitable *kua*' were not interested in sharing the catch with others. They were only interested in digging out their own *kua*, especially if the project would help. Some of them asked me to pursue the project authority to help to dig out their *kua* for their own use, not for common use.

What impact has the *kua* on farmers' activities? Firstly, they are getting a good return from small piece of land with little, if any investment. The timing of catching and selling fish is important. They catch fish in the dry season when cultivating their *boro* crops. This is a very busy time for farmers, when they have to hire labourers and they also need large amounts of cash to maintain their crops and meet family expenses. They can feed their labourers with the fish, which they catch from *kua,* and so do not require extra money to buy fish. Moreover, cash earned from fish sold enables them to purchase fertilisers and insecticides. Farmers with *kua*, choose crops according to money they are able to get from the *kua*-fish to purchase inputs. So *kua* plays an important role in making agricultural decisions.

In the floodplain area different users manage this bio-physical environment from different perspectives and, sometimes, integrate them to maintain their subsistence. These interdependencies between different stakeholders, in order to manage natural resources, is important for understanding their natural resources management (NRM) system (Tigges *et al.*, 1998; Ravnborg *et al.*, 1996 and 2000). The natural scientists failed to understand the complex, diverse livelihood of the *beel* community. As a result 'conflicts of interest' arose when they failed to implement their intervention work.

6.2.2 Open Water Bodies:

The section will discuss how people gain access to these water bodies and to what extent these influence their farming decisions. Open water bodies are formed naturally, and are not privately owned. They may not have specific boundaries. *Dara* (Channels), *khal* (canals), *Nadi* (rivers) and *beel* fall under this category. These are 'common property' and people should have free access them. However, in reality access is not

straightforward. These water bodies have multiple uses to floodplain dwellers; fishing, navigating boats, bathing, washing clothes and utensils, etc. The Government lease access to fishermen for fishing only. They sometimes obstruct the activities of other people attempting to use the lease right for different purposes (Ali, 1997).

6.2.2.1 Access to Open Water Bodies

Farmers have free access to flood water for agricultural purposes but access for fishing is complicated. The system has changed over time[2]. After Independence in 1971, the Government of Bangladesh decided to allocate open water bodies only to the registered fishermen's co-operatives by open auction. In 1991, an amendment was made to this law modifying the auction system to include a tender committee, whose members were headed by the DC (District Commissioner), along with the ADC (Additional District Commissioner) revenue, the District Fisheries Officer, the District Co-operative Officers and the Deputy Revenue collector. Under this rule, tendering was restricted to the fishermen's co-operative, which makes the highest offer for leases of the water body. Where there are no large water bodies and no traditional fisher groups, the local Land Revenue Officer along with the Fisheries and Co-operative Officers deal with the auction.

[2] During pre-British times, the fishers and farmers had certain customary rights to fish, which was continued up to early British rule. In 1793, when the Colonial British government introduced the Permanent Settlement Act, covering a wide range of property. Land, forests, fisheries, markets, etc. became private property. At that time, *ijarader* (leasee holders) took land from the landlord (*Zaminder*) for money, and who later either sub-leased or personally acted as a *sarder* (headman) of fishing. This *izaraders* were from both fisherman and non-fisherman groups.
After the British rule, in 1950, the then Pakistani government changed the rule through an amendment, the State Acquisition Tenancy Act, 1950. Under this rule, the Revenue department of provincial government of East Bengal acquired the ownership of open water bodies and the Deputy Commissioner of respective districts started to deal with this. The Additional Deputy Commissioner of Land dealt with the revenue matters of those water bodies. The management leased out the water bodies for one year to three year depending upon their state. The minimum revenue, prior to the auction was fixed according to the average of the previous three terms rent. At that time anybody could take part in the auction to bid for the water bodies. This involved many non-fishermen who were influential persons. In the sixties, the Revenue gave preference to fisher group to help poor fishermen communities.

In Ujankhalsi village, there are no traditional fisher groups. Only non-traditional fishermen fish in the *beel*. The government does not lease out all the *beel* in the area. Where there remains *khas* land (land owned by the government), it leases out these *beel* for fishing but it is restricted to registered fishermen co-operatives through an auction as stated above. This does not happen in case of the Ujankhalsi village. There are three *beel*, one of which covers *khas* land (8 acres), and the local Land Revenue office leases it out. Fishermen co-operatives take part in the auction.

However, the *Somaj* plays an important role in deciding who can take part in the auction. The *pradhan* and *pramanik* take decisions with the participation of local people as to which co-operative should obtain the lease from the local Land Revenue Office. After reaching a consensus in the village, the nominated committee apply to take part in the bidding. They, also, request some other organisations to apply to be a bidder because there need to be at least two organisations to take part in the auction. There occurs internal negotiation between the different fishermen co-operatives and the respective *somaj* so that other organisations may not offer too much money in the bid. As a result, the selected committee can get the lease with the minimum of money. The committee then sub-leases the water bodies in an open auction in the village where different non-fishermen organisations, such as local School Development Committee, Mosque Committee, Madrasa[3] Committee take part. The highest bidder then obtains the lease. Villagers show their unity against outsiders in this internal negotiation and, also, restrict outsiders from taking part in the auction. By doing this, they also help their local development organisations raise funds.

[3] A type of school where mainly Islamic religious courses are being taught.

At Charan, the other DFID's research site, the case is different. Traditional fisher groups remain there and the auction is held in the district Office. Unscrupulous people often from the non-fisher community, obtain the lease by manipulating the respective officers with bribes. The poor fishermen have little money to offer as bribes and, eventually, they fail to obtain a lease from the government. This leasee, instead of fishing in *beel*, allows fishermen to fish there with a fixed payment on either a daily basis or for the whole fishing season (Alam, 2001).

6.2.2.2 Water Bodies:

Dara, Khal* and *Nadi: A *Dara* is a channel, which inter-connects with the *beel.* Water enters and drains from the *beel* through *dara.* They lead into bigger channels called *khal*, which connect to rivers. A *nadi* is a river, which feeds into a bigger river. In Ujankhalsi the Aichan river enters the Baranai river and at one end the Baranai enters into the Baral river, distributary of the Ganges and the other end to the Atrai, a distributary of the Jamuna.

All these waters are common property and, normally, people have free access to them. The above *dara* and *khal* become full in the monsoon and dry out during the dry season. Farmers use water from these water bodies for irrigation of their crops in the dry season (Figure 6.4). They select crops for growing around these water bodies, which can complete their growing cycle with the water available there. Farmers grow mustard, wheat, pulses or winter vegetables by the side of *dara* or *khal* in the *chaitally* season when water remains there. They choose onion or paddy crops, which require continuous and large amounts of irrigation by the side of *nadi* where water remains all round.

Figure 6.4. Photographs showing surface water irrigation by farmers.

a) Irrigation *done*[4]

b) Irrigation by *seti*[5]

Beels: These large open water bodies range from a hundred to a thousand hectares. There are three *beel* around the Ujankhalsi village (see Figure 2.1). Two (Padma *beel* and Purba *beel*) are perennial and the other (Choto *beel*) dries out during dry season. Farmers cropping patterns vary according to water availability in different seasons.

[4] Long scoop like equipment 5 to 8 meter long, made of corrugated tin sheet, used in surface water irrigation. One person is required to operate it. It is much used by the villagers. It would carry 50-80 gallons of water at one operation (Figure 6.4a).

[5] It is a small, triangular shaped piece of equipment made from corrugated tin shee. Two persons required to operate it and can carry 1-2 gallons of water in one operation.

At the beginning of the *aus* season, when there is scattered rainfall, farmers broadcast seeds of *aus* paddy. At the onset of the monsoon, seedlings emerge and grow quickly and farmers use different techniques to manage them. When these seedlings become 20 to 30 days old farmers harrow and ladder the young seedlings just after the first rain. They break the base of the young seedlings, using a ladder[6] which initiates profuse tillering. In the case of transplanted *aus* paddy, when early monsoon rainwater stands on the crop field about 4 to 6 inches deep, and the crop is about 30 days old, farmers use ladder on the crop called *pani moi* (Figure 6.5) this is also to promote tilling.

People, particularly women, also use early floodwater to grow taro. Normally they grow seedlings of taro in the *doba.* When the floodwater builds up, they pull out the seedlings and leave them floating on the *beel* water to grow there. After a couple of weeks, the taro becomes large and marketable (Figure 6.6).

The first floodwater *(ashare pani or notun pani)* has a great significance for local people. According to them the *beel* gets new life at this time. They believe that *ashare pani* has strength, which promotes healthy crop growth and many new fish to grow as the water enters the *beel.*

The understanding is that when the first floodwater spreads across the floodplain, it carries nutrients from outside with the silt and decomposed matter. These nutrients dissolve in the water, increasing the nutrient status of the *beel* water, which, in turn, increases the productivity for crops and fish. At this time different organisms react

[6] This is a ladder shaped instrument on which the farmer stands to press it into the soil as both are dragged along by the oxen. Farmers use this to break soil clods, level soil and also to break the base of paddy seedlings.

Figure 6.5. Photographs showing *pani moi* on paddy seedlings

a) Farmer is using a ladder on the young seedlings just after the first rain of the pre-monsoon season

b) Farmer used ladder on the transplanted young aus paddy during the early monsoon

Figure 6.6. Photographs showing taro cultivation in the monsoon season.

a) Taro is growing in the *doba* in the early monsoon

b)Taro is growing in floating condition in *beel* water.

c) Farmer sold some of the taro from his floating stock

The understanding is that when the first floodwater spreads across the floodplain, it carries nutrients from outside with the silt and decomposed matter. These nutrients dissolve in the water, increasing the nutrient status of the *beel* water, which, in turn, increases the productivity for crops and fish. At this time different organisms react differently with this rapid change. It may happen with the arrival of *ashare pani* that the different organisms in this ecosystem react the arrival of nutrients differently. The reason behind this understanding is that, as farmers mentioned, some crops such, *Soli* or *Mitha korol* (local deep water *aman* paddy cultivars) or *Shany* (local *aus* paddy cultivar) grow more rapidly than HYV paddy cultivars. Farmers have been cultivating these local varieties in this ecosystem for centuries. On the other hand, HYVs are genetically modified cultivars and were introduced during the last 30 years. They are genetically different. As a result their physiological performances differ. Local varieties adapt themselves and respond better in the local environment, whereas HYVs are exotic, and could not respond well with the changing situation of the locality. There needs further research on this issue and this basic consideration should be taken into consideration when attempting to develop a suitable cultivar for a locality.

For the jute crop, farmers harrow to loosen the soil and to weed. This helps the crop to grow better. Farmers also need open water to ret their jute crop (to split off the fibre from the stem). They put the stock of jute plants into the water for 3 or 4 weeks to ret. If the water is clean, the fibre colours will bring a good market price. Farmers also manage other crops, particularly vegetable crops, along with paddy and jute in the monsoon. Sometimes they take special measures to get a good return from the crop. For example: sometimes the *bagoon* (aubergine) crop starts flowering too soon when the market price for the fruit is low, farmers do not want more fruit at that time and

they stop this flowering by employing certain techniques. When I visited Tajimuddin's aubergine garden, he did not want any fruit at that time, as the price was too low and he explained how he managed the situation:

> "Now the flood water is increasing day by day on *char* land ('sand bar' within or at the side of a large river), the people there are forced to sell their vegetables early. As a result the price of vegetables, particularly the price of *bagoon*, is very low. When *char* disappear under water, the price will increase day by day. Then I intend to sell my *bagoon* (aubergine) fruits. After loosening the soil (he was loosening the soil in his garden), I shall apply some urea fertiliser, which stimulates the plants to produce more leaves rather than flowers. When the price of the fruit increases, I shall use insecticide, Nogos and Sandab, to check the vegetative growth and to initiate flowers. These flowers will persist and not fall off. And I shall be able to sell my *bagoon* at a higher price. Last year I did this and got good results."

Here the important thing is that farmers have discovered such things from their experience not from the Extension Officers. They have the capability to cope with the risky environment. They experiment with their crops and fields every day and from that result they gained experience on how to cope with the situation (Richards, 1985). This is their real-life experience and from this experience they set-up their crop plan accordingly.

People also forecast the weather from their previous experiences. For examples:

- When they see ants coming out from holes, it indicates heavy rain is imminent
- When cooking salt dissolves, they believe rain is coming,
- If frogs bark in the early monsoon, then heavy rain is coming,
- If the moon is encircled by a halo in the Northeast sky, it indicates a heavy flood to come.

When they see any of these signs, they take precautions with their agricultural management. For example, if they think rain might come, they do not use any fertiliser

on crop (it will wash away), or they try to weed fields before rain (as this enhances crop growth). They do not sow any seed, if there is any chance of heavy rain.

6.2.2.3 Flooding and Floodplain Dwellers

This section deals with how floodplain dwellers perceive flooding and how they adjust their lifestyle to the floodwater. During the monsoon, rivers swell and flood over the whole floodplain. This is an annual occurrence in Bangladesh which people have lived with for generations (Paul, 1984). They arrange their farming activities taking into consideration this flooding. Some persons talk of this regular phenomenon as a hazard; floodplain dwellers think it is only hazardous when it is an abnormal flood (*ban*). When farmers find their *vita bhuin* (flood free, high land) or homestead is under floodwater, communication is disrupted, or a sudden flood destroys their crops, then it is a hazard. For women, when it enters into their homes and stays for a long period, it is a *durjog* (Shaw, 1989; Paul 1997). So the floodplain dwellers' perception about hazardous floods differs from that of outsiders. Farmers have developed some adjustments related to cropping pattern to cope with the abnormal flood.

To minimise potential losses of paddy crops from flood, farmers adopt a number of strategies. The most common adjustment of rice cropping is by early sowing and transplanting of *aus* paddy. This is done to harvest crops before the *ban*. The vulnerable pre-monsoon crop is commonly grown on the upper and middle land so as to protect it from potential damage by an early flood. During a normal year it is harvested at the end of July or early August when those plots experience only shallow flooding. Farmers may also grow early varieties of rice during the *aus* season to escape from flood damage. For example, *china*, a HYV cultivar is normally grown on medium

high land and can mature within 90 days and so it is possible to harvest this paddy before high flooding.

Another common practice is to inter-crop *aus* and broadcast *aman* paddy. Farmers do this to ensure that at least one crop will be secure during abnormal flooding. If early flooding occurs, it will damage *aus* paddy but flood tolerant *aman* paddy will survive with the increase of water. When it is normal flooding, both paddies give a good harvest. First farmers harvest their *aus* paddy during the month *Bhadra* (mid August), leaving their *aman* paddy in the field. This traditional photoperiodic sensitive rice flowers when the days are comparatively short and during the onset of winter. This late maturing paddy is advantageous to farmers. They normally grow it on the lower land, where other crops do not grow during the monsoon. It also helps to reduce workload because the harvesting periods for the two crops are at different times (farmers harvest their *aman* paddy in November or December). If it is in the same season, farmers have to work hard to manage their work.

If rains or flooding occurs too early and their broadcast paddy is damaged, farmers may decide to transplant paddy on the plot again. Although this means that it needs more seeds or seedlings, which can be a problem for poor farmers, who must sometimes borrow from their neighbours or relatives and pay back later after harvesting.

There are also various techniques for transplanting *aus* paddy to save it from flooding. Water is needed to prepare the land for transplanting paddy. Normally, rain comes during June. It is too late to sow seeds for growing seedlings for this paddy. To produce seedlings mature enough for transplantation at the onset of monsoon, farmers

produce seedlings in *dhulo bees tola* (tilth seed bed) (Figure 6.7). With this method, farmers prepare their seedbeds dusty and sow germinated paddy seeds by putting a thin layer of soil over them to protect them from pests. They do not use any water on the seedbed. Farmers pull out the seedlings when the monsoon starts.

The above examples show how farmers make adjustment to their paddy, during the flood period. Similarly, they have different adjustive methods for different crops. They also have number of cropping adjustments after abnormal flooding. They usually have an idea where to grow what if the floodwater recedes in expected time. If it does not, they change some of their plans, either by substituting one crop for another or providing a supplementary to others. It depends on the *ju*[7] (moisture content) of the plots and its suitability for the relevant crops. For example, wheat instead of paddy (as they can harvest it earlier than paddy); or mustard, lentil and other pulses to supplement paddy (they treat these as 'chance' crops due to their short duration) or more cash crop like onions and or winter vegetables to cover the cost of possible damage.

Figure 6.7. Photographs showing seedling preparation on *dhulo bees tola* and its use.

a) *Dhulo bees tola* (Tilth seed-bed)

b) Pulling out seedlings

c) Transplantation of *aus* paddy seedlings during the early monsoon.

[7] The proper moisture content of soil, necessary for sowing seeds for a particular crop. To local farmer, this moisture content is specific for a specific crop.

When there is devastating flood, like the flood of 1998, farmers face severe problems poorer families suffer greatly. Among the coping strategies that I observed were:

- Selling poultry and livestock (chickens, ducks goat, cattle);
- Selling wood (trees);
- Changing food habits (reducing meals (to one instead of three), increasing consumption of wild foods, and increase intra-family disparity (normally women take less food than men);
- Consume stored seed (this causes serious problems in the next season and they have may have to change cropping decisions due to lack of seeds
- Engaging in fishing
- Borrowing money from relatives, moneylenders, NGOs or landlords.
- Engaging in alternative income generating activities (van pulling, seeking work in urban areas, - there is less work available in rural area (as wealthier families reduce their farming activities).

All the above strategies have a direct or indirect impact of agricultural decision making process by farmers. They adopt these strategies to reduce expenses during these difficult times. They do not want to do things that will cause them problems in the next cropping season, after the flood (e.g. they do not want to sell their oxen as they need these to plough their land just after flood). If they have to sell cattle, they part with cows or calves first, then, if necessary, the oxen. If they are sharecroppers, they have to grow crops directed by the landlord and if they have eaten seeds they may not grow their expected crops due to lack of seeds and have to grow less profitable crops on their own land in order to maintain a good relationship with the landlord. If they borrow money from their landlords, this further increases the landlords' influence over them.

6.2.2.4 Flood Action Plan and Floodplain Dwellers

The government of Bangladesh, with the help of the World Bank and Asian Development Bank, has implemented the Flood Control and Drainage (FCD) Project throughout the country with the aim of assisting farmers in times of flood. This project started in 1964-65 and ended in the late 1980s. Under this project, about 82,000 km^2 of flood vulnerable land has been protected by constructing embankments along rivers with sluice gates, where necessary, to regulate water intrusion and to provide proper drainage (Alexander *et al.* 1998). The proposed scheme assumes that the uncertainty of floodwater could be minimised by the engineering regulation of water levels, so that the rice production would be more secure (FAP 12, 1992; Brammer, 1990). My field experience shows that the FCD project has created more problems for farmers instead of protecting them or their crops from flood damage.

6.2.2.4.1 Flood action plan and farmers:

A major problem of this scheme is the operation of the sluice gates. There are considerable uncertainties about regulating floodwater inside the *beel* in an optimum manner. When any unfavourable circumstances occurs, farmers have to apply to regulate the water level through the local authority appealing to the higher authority, who, normally reside in the district town. It gives permission to regulate the sluice gate. This bureaucratic process takes a couple of weeks and sometimes the authority does not even respond to the application. In 1997, at the outset of the monsoon, there was heavy rain and water congestion occurred during the period of *aus* paddy harvest and the crops disappeared under water. Farmers requested the local authority to drain the water out immediately but it was three weeks before the sluice gates were opened to drain out the congested water by which time all the crops were damaged. If the water had been drained out within a week, farmers could have saved their crops.

What are the consequences of water retention in floodplain areas? Where this occurs it proves tragic for farmers. In 1997 the growth of *aus* paddy was good and farmers thought that they were going to get a good harvest. They did not imagine that their crop would be damaged due to flooding, thinking that the regulatory mechanism would protect it so they sold most of their grain. While the flood was not as extreme as a *ban,* nevertheless it resulted in considerable suffering for the poor. This was because they had to buy their food grains at a very high rate, which normally occurs during crisis period. Moreover, they lost their seeds for the next season.

In 1998 there were heavy rains in the upstream catchments areas of the major rivers. This caused river levels to increase suddenly and over top the riverbank. To protect the *band* (embankment) from breaching, the authority trussed water inside the *beel* without informing farmers, which, ultimately, destroyed their *aus* paddy and prevented the transplanting of *aman* paddy. Farmers were more careful this year, not selling their food grain before harvesting their *aus* paddy. So hardship was not so severe as in the previous year, although the flood was prolonged and severe.

Another problem is that, due to siltation, the beds of sluice gates are raised obstructing water drainage through canals to rivers and create water congestion inside the *beel* area. During the post monsoon season, this delays the farmers in preparing their land for crops and, sometimes, they had to change their cropping decisions. In a problem census conducted by the LWI project at the research site, people put water congestion in the *beel* as their first problem.

Another hazard is the breaching of embankment by farmers. When farmers suffer from drainage congestion inside the embankment, they may cut the embankment to relive from it. This causes sudden and sometimes results in uncontrollable flooding, which can be severe and hazardous.

Controversies arose among researchers after implementing this project. According to them, instead of mitigating sufferings from flood, the flood control project creates more misery for floodplain dwellers (Alam, 1990; Adnan, 1991 and 1994; Custers, 1992; Haque and Zaman, 1993; Wescoat and Jacobs, 1993). After implementation of the FCD project, farmers believed that they would be able to harvest their crops in time but most of the year they face the prospect of crop damage. Most of these were from operational constraints with the defence mechanism which upsetting farmers' crop planning. Farmers design their cropping pattern to link up like a chain throughout the year. When there is a break in this chain, it is difficult to re-established the pattern again and continue it for the rest of the year. They have to re-design their planning or if the damage is severe and difficult to repair, sometimes, they have to give up farming and seek another occupation to cope with their situation. Beside the above problems, the FCD creates other problems for farmers. These are:

a) **Loss of soil fertility:** During the problem census conducted by the LWI project, the villagers reported that their second largest problem was that soil fertility had decreased substantially. For some, it was the most serious problem. They attribute it to decreasing rate of silt deposition due to the regulation measures and also indiscriminate use of fertilisers and insecticides. Alexander *et al.* (1998) report significant adverse changes occurring in several soil properties: increased acidity, and a decline in available nutrients 'inside' the project area in comparison to 'outside' in the same floodplain area.

b) **Loss of bio-diversity:** The flood control projects emphasise the need to increase HYV rice production by providing flood protection to floodplain areas. The whole floodplain ecosystem has received little consideration. By doing so the rich crop diversity of the floodplain has been lost, narrowing down the choice of crops. For example, once there were more than 100 local paddy cultivars, which were well adopted to the floodplain environment, now there are only between eight to ten cultivars available to the farmers. The HYV cultivars introduced by the extension services are suffering from decreasing yield performance over time, due to 'inbreeding depression'[8]. So the questions have been raised about the suitability and sustainability of HYV paddy for long-term use in this environment.

c) **Water scarcity in the monsoon season:** Floodplain people talk in terms of sufficient suitable water for their activities rather in terms of volume or rate of water. During the monsoon, water is everywhere. Crops need optimum amounts of water at appropriate times in order to grow. Water arriving early or receding late can cause damage to crops. FCD was seen by the farmers to be the cause of these problems. Beside this, good quality water to wash their livestock and utensils is also scarce now (Soussan, 2000). Farmers also experience some irritation on their skin when they work, bathe and wash their livestock in *beel* water. I think this is probably due to the increase in pollutants in the water. So, in reality, usable water is scarce in the monsoon. Later we will see it is also scarce in the dry season.

[8] Normally HYV seeds have been produced by crossing two distantly related plants of the same species or genus. This crossing may give rise new generation with good yeild. However, if this plant grows generation after generation without further modification, its growth and yield would decrease over time (generation after generation). This is known as 'inbreeding depression'.

6.2.2.4.2 Flood action plan and fishers:

There are very few people in the floodplain area who make their living solely from farming or fishing as most of them integrate both occupations. In a sense, most of the dwellers are partly fishers and party farmers. In Ujankhalsi only four households are fully dependent on fishing. Open water fishing is low status occupation and, normally, only poor families do this, although rich and medium households catch fish from the *beel* for their own consumption (Figure 6.8). Some small farmers also catch fish from the *beel* both for consumption and sometimes for sale if the catch is large enough. Several households rely on open water fishery for their living in the monsoon and post-monsoon season. They supplement their fishing income with agricultural work and other non-fishing activities. Some are also able to save an appreciable amount of money from fishing in the monsoon period and use this money to produce crops in the next season. In floodplain areas, cropping decisions are linked to fishing activities. When floodwater begins to encroach into the *beel* area farmers harvest their *boro* (dry season) crops.

Farmers take few weeks in completing post-harvest works and after that they need little effort to manage their *aus* crop and so they engage in fishing. On the other hand, fishermen fish until the *beel* dries up, when they participate in farming either as sharecroppers or agricultural labourers - both occupations are complementary.

Fishermen normally have no or little land of their own. Their agricultural practices are different from those who farm, both from an economic and a technical point of view. They have few, if any farming implements, mostly they pay to hire them.

Figure 6.8. Photographs showing fishing during the monsoon season

a) A kid is fishing with a trap

b) A farmer is fishing with a small push-net

c) Fishing with a large push-net used by fishers

As they have limited land, some of them enter into sharecropping agreements with landlords. Demand for them in the 'sharecropping market' is less, because they have insufficient time to look after crops and are also ill equipped. If they have enough family members to manage the sharecropped land, they may be able to get some land. Kalimuddin, Yadali and Samad are fishermen who have other family members looking after their crops. But Khalil, another fisherman, has no other males in his family to manage his sharecropped land. He has to rely on *kot* (mortgaging) to enable him to get land to farm. He has some land by mortgage and tends to grow cash crops, such as onions to earn money from the land. He fishes in the *beel* most of the year, so he has a steady income, with which he can buy rice from the market and can manage his crops with his fishing income. Kalimuddin and Samad grow grain crops, such as paddy or wheat on suitable land, because they have sufficient labour to look after the crops. Therefore, it appears that cropping decisions are different due to different family circumstances.

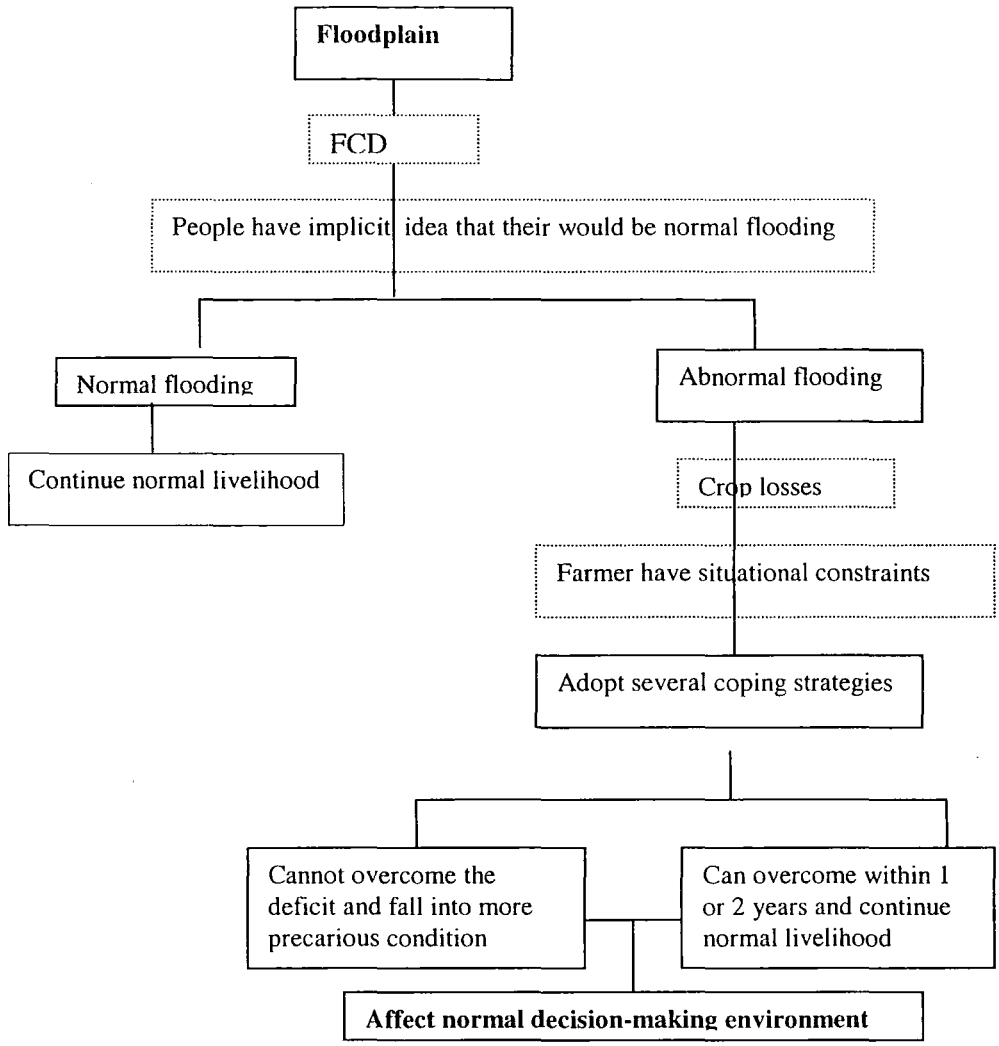
The FCD has had a great impact on the floodplain fisheries. Fishermen have to wait for the incoming floodwater, to bring in fish fry. This Flood Control arrangement does not allow fish fry to come into the *beel* areas during the early monsoon. This is because the sluice gates remain closed at that time and so prevent the early flooding on which fishermen are dependent. This group of floodplain dwellers is adversely affected. Others who earn a part of their livelihood from fishing and depend on these fish for their consumption are also affected. Sometimes prolonged, severe floods lead to fishponds overflowing and the farmed fish escaping into the *beel,* which is to the fishermen's advantage. In 1998, there was exceptionally heavy rain and most ponds overflowed and their cultured fish escaped into the *beel* increasing fishermen's catches

over that of the previous three or four years. Thomson and Sultana (1996) examined the distributional and social impact of 17 FCD projects and claim that flood protection has particularly disadvantaged fishermen and boatmen. Other studies (Boyce, 1990; Thomson, 1990; FAP, 1995; Ali, 1997; Craig *et al.*, 2000) also report the loss of open water fisheries due to many of the existing flood control projects. So, fishermen, who are entirely dependent on the floodplain fishery are facing serious problems in making their livelihoods (Barr and Gowing, 1998; Sillitoe, 2000c).

Another social consequence of this engineering is that when there were plenty of fish in the *beel,* while work was scarce, fishing was an attractive source of income and a number of people engaged themselves in it. Nowadays with the scarcity of fish in the *beel*, some fishermen are ceasing to fish and are accepting other work, such as van pulling, petty business, or they migrate to urban areas to earn some money.

The above discussion reveals that FCD has increased risks to the floodplain dwellers, particularly to the farmers. The congestion of *beel* water has increased due to the improper regulation of sluice gates and as farmers are facing crop losses due to this unusual, severe flooding. Normally farmers make their cropping decisions considering usual events (i.e. normal flooding). However, when they face any crop losses due to any unusual events, they fall into 'situational constraints' and ultimately this drives farmers to seek for alternative strategies such as, mortgaging or selling land, borrowing money or food grains from others, etc. to mitigate the vulnerability. Ultimately, this affects the individual's decision-making process (Figure 6.9).

Figure 6.9. Flow chart showing the consequences of abnormal flooding.



6.2.3 Underground Water Bodies

The sub-surface water resource is also 'common property' to which people can gain access to by constructing tube wells. The land portion owner has the right to set up the well and use the water resource. This section discusses the impact of dry season agriculture on rural people with emphasis on how it influences their cropping decisions.

6.2.3.1 Underground Water and Dry Season Agriculture:

Agricultural development in the study area can be divided into three phases. The first phase was after Independence (from Pakistan in 1971) when the government introduced high yielding varieties (HYVs) of paddy. At that time, there were no mechanised irrigation facilities and farmers had to rely on rain for agriculture. Dry season agriculture was limited to those areas where surface water irrigation was possible by traditional methods, and crops requiring less water such as wheat, winter-onion, etc. were grown. During the monsoon, farmers cultivated HYV paddy on their high and medium high land and local deepwater *aman* paddy on their low land. These deep water *aman* paddy cultivars are unique in terms of their adaptive capability, as they can tolerate very high floodwater depth, growing fast and keeping up with the increasing depth of the floodwater, up to more than 9 inches a day (Khan *et al.*, 1994). But their productivity is low in comparison to HYVs.

During the early 1980s, farmers started small-scale irrigation in the dry season by introducing 'shallow tube well' (STW) irrigation. In some years, farmers faced crop loss due to water shortages as aquifers went down. The extent of cultivation and amount of produce was not sufficient to meet their requirements and farmers had to rely on both dry season and rain-fed agriculture. Up to that time, rain-fed crops were the main ones for farmers to produce. In 1994, the Barind Multipurpose Development Authority[9] (BMDA), installed two deep tube wells (DTW) in this village, and more in neighbouring villages, to expand dry season agriculture. Now farmers have sufficient

[9] BMDA, a government supported organisation, which looks into the development of Barind Tract area. The Barind Tract is a Pleistocene terrace, comprises about 8 per cent of the country, facing environmental degradation (Alam, *et al*, 1992). The Bangladesh government has been providing support for achieving a sustainable environment there. Although the study area is outside the Barind Tract, the activities of BMDA covers this area.

water to cultivate crops in the dry season. They are pleased when they harvest good crops and few natural hazards have occurred. Thus the dry season has now become the main cropping season in the study area. Farmers mentioned the following reasons why they prefer this cropping season:

- Farmers now have a good harvest of their main crops such as paddy and onion in the *boro* season when previously they had very few;

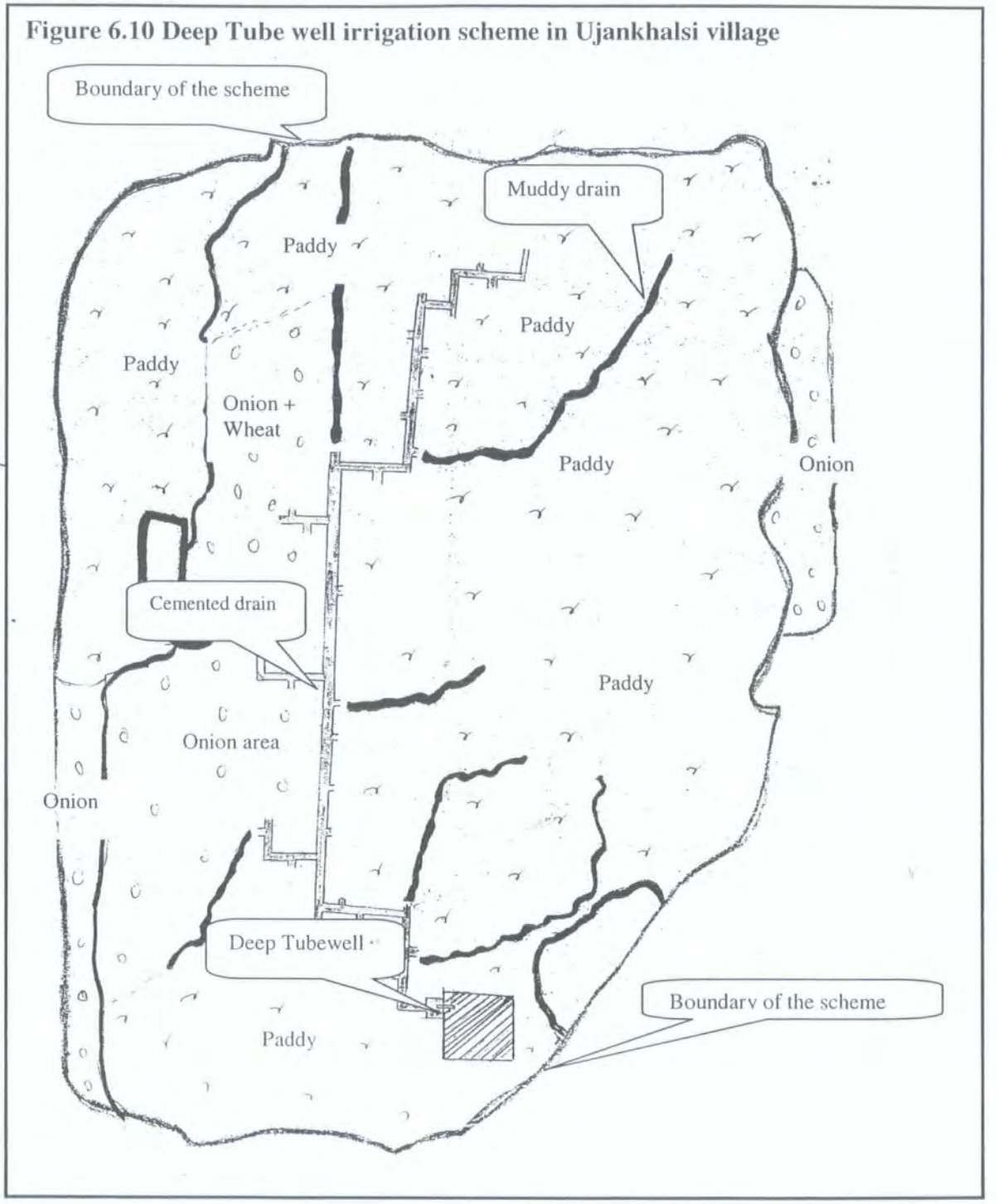
- Dry season agriculture has proved comparatively more secure than rain-fed agriculture, because there are fewer natural hazards at this time;

- It is more productive than in the rain-fed season. For example farmers used to get about 16 *monds* (about 592 kg) of paddy per *bigha* in the monsoon season, and now they are getting about 22 *monds* (about 814 kg) of paddy from the same land in the dry season;

- It fits well with other seasonal activities.

Two main crops are grown in the dry season, HYV *boro* paddy and onions. These crops have different water requirements. It is not possible to grow the two crops in the same area. For example, a farmer cannot grow onion if his neighbours are growing irrigated dry season paddy because lateral seepage will make the soil too moist for onion and cause damage (Figure 6.10). Neighbour's cropping patterns influence one another's crop planning.

Figure 6.10 Deep Tube well irrigation scheme in Ujankhalsi village



This provides an incentive for negotiation and co-operation with other farmers. On the other hand, there can be problems for some farmers who wish to grow a different crop to that of their neighbours. If he is a poor farmer, the problem is more acute. For example, Atahar said

> " last year I intended to cultivate paddy but the surrounding plot holders cultivated *piaj* (onion) and I had to cultivate it too. If I was to cultivate paddy at that time, neighbouring plot holders would resist it and the DTW owner would not supply sufficient water for paddy because this would damaged others' crop by excessive water. You know, I am a poor farmer and I need to grow some paddy for my subsistence but I could not grow it there. I have to grow it on other land."

In deep tube well irrigation, the deep tube well (DTW) owner plays an important role in selecting crops. Each DTW has its own command area and the owner is obliged to supply water to that area. He gets a share of the produce and money for the water. For paddy cultivation, it is 600 *taka* per acre plus one fourth of the crop; and, for onion, it is 2,500 *taka* per acre with no share of the produce. Farmers are satisfied with the agreements with the DTW owners, as the latter often pay attention to the water condition of crops and so supply water when necessary in their own interest. Sometimes DTW owners dictate to farmers which specific crops to grow on their 'irrigated command area' and farmers have to comply; otherwise they will not receive water for their crops. In 1997, there was a hailstorm when HYV *boro* paddy was about to be harvested (in Bangladesh, it is common in the late summer season) which caused damage to some paddy cultivars such as BRP and BR-26, but IRRI -TOM did not suffer because of its strong panicle. The *china* variety was harvested before the storm. This storm was detrimental to the interest of DTW owners as they received less produce and it was not profitable for them as they had invested a lot of money to run the machinery efficiently. The next year they came to an agreement with farmers that

they would grow IRRI -TOM or *china* on their plots, otherwise, they would not supply any water to these plots. The farmers had to agree. However, some farmers (mainly medium and rich ones) prefer BRP and BR-26 cultivars due to their fine texture and taste but they were not able to grow those varieties there.

So resource management activities vary between different stakeholders and are intimately linked with other, as many decisions cannot be taken independently, what other people are doing has to be taken into consideration before taking any decision.

6.2.3.2 Dry Season Agriculture and Its Impact

According to local people this dry season agriculture has had some negative impacts on rural livelihood patterns in *beel* areas. Although production is higher than in other seasons, farmers have to use large amounts of *sar* (fertilisers) and *gas* (pesticides) to manage their crops. As the farmers reported to me, these *sar* and *gas* stay in the soil and water for a long time and consequently, pollute and damage them. Fish species are affected by this pollution, as some fish, mainly *Koi* (*Anebas testudineus*) and other catfish, lay eggs which remain in the soil for the fry to be released in floodwater. This is one cause of decreasing fish species on the floodplain areas. It has another consequence on fishermen. During the flooding period, currents of floodwater are very strong and few fish can withstand them. If there remain paddies within the *beel*, the speed of flow slows down and fish can find shelter there. They can feed there and eventually release their eggs into the *beel.* As I have mentioned earlier, Choto *beel* and Purba *beel* act as a drainage basin for the surrounding *beel.* These two *beel* have the potential for producing large numbers of fish. When farmers used to grow 'deep water *aman* paddy', there were many fish in the two *beel* but now fish species have decreased

drastically. So fishermen are also affected by the introduction of dry season agriculture, as well as by the flood control mechanisms.

The intensive dry season agriculture has an impact on farmers. They harvest their dry season paddy during May and are engaged throughout June in post- harvest activities (processing, drying, storing, etc.). In the mean time, the next cropping season (*aman* season) begins. There is only a short gap between the two cropping seasons and *aman* paddy seedlings could not get enough time to attain so big as to tolerate if early floodwater (see figure 3.2 p56). So there is a risk in growing further crops on medium lowland areas. Farmers, mainly rich and medium ones, are reluctant to grow deep water *aman* paddy on their *beel-er bhuin*, but poor farmers wish to do so because they harvest fewer crops than rich farmers, and need to grow more crops for subsistence. The deepwater paddy cannot grow in a small area. If it is not extensive, floodwater might wash it away and 'in-coming free floating weeds' (like water hyacinth) may damage the paddy. It is difficult to manage a few small plots in the *beel* area. Rich and medium farmers own most of the plots in the *beel* area and they do not want to grow this crop. Many of these farmers do not want to give their land for sharecropping to poorer farmers for growing deep water *aman* paddy for one *aman* season and sharecroppers are also not interested to sharecrop land only in the risk prone season. Even so, I found a few plots where poor farmers, were cultivating deepwater *aman* paddy in the monsoon period. So from this example, it can be ascertained that farmers do not always want to maximise their output. Although sometimes they do, one of the major reasons for this is the need for subsistence grains. As poorer families need more grains, they have a tendency to maximise their output.

This deepwater *aman* paddy is important to farmers, the top straw serving as fodder for cattle and the rest of the straw as fuel. After burning this straw, farmers keep the ash. They use this to control pests and it proves very effective. It makes the onion crop healthy and effectively controls some pests of this crop. This ash could not be substituted by HYV paddy straw. To farmers ash from this *aman* paddy straw is different from that of HYVs' which has not proved effective as the traditional *aman* paddy. Farmers now buy this ash from the market or from other farmers; otherwise, they have to rely on the commercial pesticides, which are difficult for poorer farmers to afford.

The cultivation of deepwater *aman* paddy also has an impact on soil fertility. There are two views about this among farmers. The first view is that this paddy decreases soil fertility. If farmers cultivate this paddy on their plots, the next crop does not grow so well there, because the nutrients have been extracted from the soil. If they allow the soil to rest for a season, the next crop does better. They are not interested in growing 'deep water *aman* paddy' during the monsoon period as the dry season crops are now important for them. The second view is that this paddy extracts nutrients mainly from water and very little from the soil. A number of lateral roots emerge from each node, which it is believed extract nutrients from the water. They also claim that sometimes the main taproots rot down and the paddy survive in a floating condition. If it depends on soil nutrients, then how can it survive when floating? Those who believe the second view also maintain that instead of extracting many nutrients from the soil, this paddy helps to deposit silt on the soil, which enhances its fertility for the following crops. The crops, they say, grow well on those plots where deep water *aman* paddy has grown.

Scientific research on this issue proved unavailable. So it could not be confirmed whether the deep-water paddy enhances soil fertility or not. Nonetheless, the important thing is the conflicting ideas about indigenous knowledge among the local people. Why is this conflict? The main reason appears to be the 'relative interest' of people. 10 years ago the farmers were dependent on this deep-water paddy, which they grew extensively in their *beel* land. Now they have dry season crops with less risk and a good yield. After getting a good harvest, they are reluctant to take any risk with this low yielding paddy and, ultimately, lose their 'interest' in it. They think they might compensate for their losses by furthering dry season agriculture and maintain that this crop decreases soil fertility. On the other hand those, who said it did increase fertility, were interested in growing more crops.

Personal perception is also important here. Indigenous knowledge is the result of a person's experience obtained from his or her day-to-day activities. The context of a person's activities, his / her 'interest' and 'need' is crucial in gaining knowledge. Therefore, indigenous knowledge cannot always be uniform as there might be some people who hold conflicting views. From the point of this study, it bears great significance. This 'conflict of interest' between farmers or 'dilemma', effects people's decision-making process.

The harvesting period of deepwater *aman* paddy is from mid-*Agrahayan* to mid-*Poush* (December to January). When farmers cultivated this paddy intensively, (i.e. before 1994), a large number migratory birds used to visit the area for shelter and food. When the *beel* began to dry out and the paddy was ready to harvest, there were plenty of food (fish and paddy) for these migratory birds. People used to catch these birds by traps or

nets. They ate some and sold others in the market. This had an impact on agriculture. The situation has now changed and few migratory birds are to be seen during winter. Now there are little food in the *beel* during the winter and as farmers keep them working in the field all day, it is no longer a safe place for birds. Like fishers, these local bird hunters have changed their occupation and either become labourers or sharecroppers or take some other suitable occupation.

So the government's interventions in order to rectify 'Green Revolution problems' and increase food sufficiency, has created many new problems for the floodplain dwellers. When the authorities implemented the new measures, they did not take the local situation into consideration. They ignored the livelihood patterns of the local people, their expertise and the complex nature of their socio-ecological system. Questions are now raised about the sustainability of the new measures in the long term.

6.3 CONCLUSION

In this chapter, I have discussed how the availability and management of water resources influences farmers' decision-making processes. Many factors are involved in making cropping decisions. However, floodplain research and development has tended to focus on specific natural resources or commodities (e.g. Mahatab and Karim, 1992; Ali, 1995), rather than the activities that households depend on for making a living (Karim, 1994; Ellis, 1998). People have evolved complex livelihood strategies in order to cope. Their different activities are intimately associated with others due to the seasonal dynamic nature of aquatic and terrestrial regime and it needs a 'system based' approach to understand the people's livelihood strategies (Zaman, 1993; Barr, 1998; Barr *et al*, 2000; Craig *et al.*, 2000; Soussan 2000).

The village of Ujankhalsi is typical of many other floodplain villages in Bangladesh, illustrating these complex interactions. Here people have adjusted their livelihood pattern to their environment over generations. They do not have only one set of options in making agricultural decisions but have many; when their first choice fails they look for second or third alternative. In this way they try to maximise their cultivation of crops in a risky environment.

The selection of crops depends on the context and content of the actor's position. In some cases it is independent and varies from person to person, as has been shown in case of Lutfor and Jeher or Kalimuddin and Khalil. Some decisions are not independent, what others are doing determines one's choices. These farming constraints force people to negotiate with others and to change their decisions. To obtain irrigation water in the dry season, farmers have to follow the water sellers' directions and grow a specific variety of crop under his irrigation scheme. Poorer farmers may face problems with this. They have few resources of their own and with these, they try to satisfy their livelihood requirements but in some cases they fail.

The Government has implemented two major interventions: FCD and irrigated dry season agriculture. The main reason for these interventions is to increase rice production. Development practitioners can calculate the gains for one or few terms, but not how is it possible to measure the impact on other related activities. Some studies point out that the Government's structural solution failed to bring about the desired economic benefits. Stewart (1988) found that the average material damage was worse inside the embankment than in the areas outside. The Bangladesh Agricultural

Research Council (BARC, 1989) found that the area flooded had increased when more rivers are embanked with the aim of controlling floods.

According to the World Bank or the Government, the intensification of agricultural practices has ensured Bangladesh food sufficiency or near sufficiency but in doing so, it has done un-repairable damage to many people's livelihood. In the floodplain, peoples' livelihoods are not straightforward. Many events influence their livelihood and other related pressures create an impact on them, which affect their livelihood negatively. For example, once the floodplain area was rich in bio-diversity and the farmers had more choice in making agricultural decisions. Now crop diversity has shrunk and they have to make their choices from a narrow range of crops, which makes them more vulnerable. So it needs holistic an approach research to understand the floodplain people's livelihood and their decision-making process.

7. CROPS AND CROPPING DECISIONS

7.1 INTRODUCTION

Being a subtropical country, Bangladesh is suitable for the growing a wide range of crops. Variations occur both regionally and locally, and even within individual villages. Both the natural and social environments surrounding them determine the cropping choices of farmers. They make decisions with respect to their households' needs and goals as well as the resources available to them. This chapter will explore how farmers choose their crops, the opportunities and the constraints they face when attempting to cultivate them.

The chapter will also discuss general cropping patterns and crops available of farmers in the study village, how they choose different crops; circumstances that cause them to change their cropping patterns, and problems usually arise when farmers' have to make decisions.

7.2 THE CROPS

In the floodplain, homesteads are clustered on the flood-free lands and every household has its own crop production regime. As not all lands are suitable for growing crops the whole year round, farm families cultivate crops in both their homestead garden and the open fields in order to manage their livelihoods. Although field crops receive most attention in studies of crop production systems, homestead

crops may influence field crops have largely been ignored. This section will first discuss homestead crops and then show how farmers inter-relate the two sectors.

7.2.1 Homestead Crops:

Some studies have been made exploring the importance of home gardens elsewhere in the world. Wilken (1987) found that Guatemalan home gardens have a four-tier system ranging from tall trees to medium height trees, to high and low level crops, shrubs to medicinal plants and lastly, cooking herbs. Seavoy (1986) also found Javanese gardens are multi-storied: a canopy of coconut palms and mangoes sheltering bananas and coffee with taro and cassava at ground level. The study by Stoler (1981) of Indonesian home gardens shows a similar composition of plant species.

Bangladesh home gardens follow a traditional production system where people cultivate plants for multipurpose use. They are a customary source of food, timber, firewood, fodder, fibre and medicines. In most of the literature on home gardens in Bangladesh (Hocking and Islam, 1994; Hocking *et al*, 1996; Millate-e-Mustafa, 2000) combines floral composition, structure, management and economic aspects, but pays little consideration to cultural issues i.e. how it affects their daily life and, also, how it enables them to maintain their livelihood.

In rural Bangladesh households either own or share homesteads. Their homestead land signifies the status of farm families. It is in Bangladesh that the wealthier the family, the larger the homestead and its production unit. The homestead gardens, like those of Guatemala or Java, is three or four-tiered with trees, shrubs and herb crops, largely managed by women. Agriculturists tend to notice and concern themselves with field

crops and neglect the crop diversity of home gardens. Men overlook and undervalue them and most professionals are males who meet and interact more with men. They are more interested in marketed agricultural produce, which is mainly managed by the men. The product of home gardens remains largely unseen because it is not marketed or sold irregularly on a small scale (Rocheleau and Raintree, 1986; Hoogerbrugge and Fresco, 1993; Hocking *et al.*, 1996; Chambers, 1997). These crops are destined mainly for a family's own consumption. The home garden is often treated as a secondary source of food and income, while field crops are the major source of household support.

A range of vegetables and fruits are grown in home gardens and regularly form part of the diet, whereas field crops consist in the main of grain for home consumption and sale. In terms of diversity and quality, home gardens play an important role, which is normally ignored in agricultural studies. Bloem *et al* (1996) found that traditional homestead gardens in Bangladesh provide valuable vitamin-rich fruits and vegetables, which are scarce in other dietary sources. They provide not only vitamins, but are the source of other essential nutritional elements. So consideration needs to be given to the diversity of Bangladeshi home gardens.

Millate-e-Mustafa (2001) records 120 perennial species from 200 home gardens and about 85 species having more than one use. He does not include any annual plants or herbs. If he did, the number of species would be far more. In his study, he found that some species (e. g. mango, coconut, etc.) have more than seven uses. Women nurture the gardens and they can choose what they plant according to their family's needs. These consist mainly of fruits and vegetables, spices, construction and craft materials, medicine, live fence, etc. purposes.

In Ujankhalsi field, I observed the high yielding field crops cultivated by men are less tasty than those grown in home garden. For home consumption, women prefer better and diverse tasting varieties for their cooking and, so as they conserve these within their homestead gardens. For examples, chilli is a common cooking ingredient in Bengali dishes. It is also an important cash crop and is cultivated in fields. Women cultivate different *jat* (cultivars) in their homestead gardens such as *dhanya*, *batasha*, *kamranga, bagha*, *bombai* etc. These are biannual or perennial varieties and each has a different taste and flavour, which are needed to prepare different pickles, chutneys, and other foodstuffs with different tastes. Banana is another important cash crop and the cultivar, *shobri,*, is a popular field crop.

However, every homestead in the village has a banana plant but not the same cultivar as field. These are *anaji*, *bichi*, *chini champa*, *kathali*, etc. Some of these are harvested as green vegetables others as ripe fruits. There are different types within each *jat* (cultivar), and each type has a particular significance. Every household has its speciality of the *jat* of different crops. For example, the pumpkin of one household may be different from that of other in terms of flesh, colour, thickness of skin, etc. In this way each homestead crop has numerous varieties within the same village. All these traditional varieties are nurtured and conserved within the homestead area by the women.

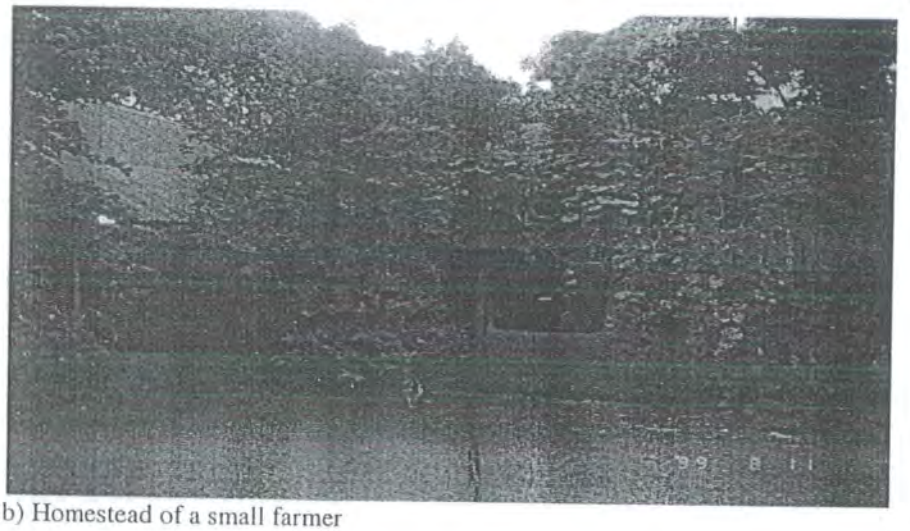
Women not only cultivate crops, but also are also responsible for domestication of several wild plants (Sillitoe, 1983 and 1993; Rocheleau *et al*, 1985). In this village I often heard a proverb among poorer families "*kochu ghechu kehe beche aasi*", which means, "we are surviving by eating wild plants". From this proverb, it is clear that wild

plants are an important part of the daily diet of the people. Women are responsible for collecting and nurturing these plants. To make the collection easy for cooking, they use to leave some wild plants within homestead areas to grow. By doing this, some plants now have a market value, like *moulovi kochu* (*Colocasia antiquorum*), *kali kochu* (*Colocasia sp.*), *kalmi* (*Ipomea reptens*), *halencha, shushni* (*Marselia quadrifolia*), *note shak* (*Amaranthus blitum*) etc. These are still grown in the wild; however, nowadays women from poorer families have been showing more interest in growing such plants to earn money from their sale.

Basically, the plant diversity of home gardens is considerable. Wealthier families are interested in growing more tree crops for firewood, timber and fruit than poorer families who grow more vegetable crops. The latter have limited space and try to get the maximum benefit by densely planting crops (Figure 7.1). These diverse farming practices also reduce vulnerability and enhance the security of livelihood (Chambers, 1997). During lean periods, the low-income families depend, particularly, on leafy vegetables and fruits which, in part, compensate nutritionally for their lower consumption of rice (BRAC, 1983; Wallace et al, 1987; Chambers, 1993; Stokoe, 2000). So the importance home gardens in Bangladeshi rural livelihood is immense and so underlies the value of this thesis.

Who chooses the crops and how? Women as the managers of home gardens, make the decisions about these crops. Sometimes, men decide certain crops, e.g. those which have a market value, although women are responsible for taking care of them. They have clear ideas about the seasonal variation of rainfall, temperature and sunlight and choose their crops accordingly (Rocheleau, 1987; Hoogerbrugge and Fresco, 1993; Sillitoe, 1993; Gill, 1995).

a) Homestead of a medium farmer



b) Homestead of a small farmer

c) Homesteads of two poor farmers sharing common courtyard

Figure7./Homesteads of different categories farmers.

The availability of seeds plays an important role in cropping decisions. The seeds of most crops are grown in the home gardens, and are less readily available in the markets. Women, on the whole, store their own seeds. If they have no seeds of any desired crop, they may borrow them either from neighbours or from relatives, using their strong informal networks. They visit each other's houses and so know each other's crops and also exchange seeds with each other (Abdullah and Zeidenstein, 1982; Nath, 1986; White 1992). In Ujankhalsi, I heard that the *jat* of certain crops (such as pumpkin, grapefruit, etc.) of one household is better (in terms of quality and production) than others. Therefore people are keen to obtain them to grow in their homestead gardens.

However, if a woman has extra seeds of one popular crop, she will not give them to others before seeing how her crop grows. If it grows well, she will give the excess to others. The folk women call these *ma beez* (mother seeds). They believe that if they give their *ma beez* to others before sowing their own crop, next year they will have few good seeds and that crops will leave their house. Just as if you turn away your mother before feeding her, she would not come back again to your home. So to maintain the main stock of their seeds, they support this belief. This is just a superstition to extension workers and agriculturalist, but in terms of conserving crop diversity such beliefs plays a vital role in rural areas which are often neglected by development practitioners (Chambers *et al*, 1989; Sillitoe, 2000a).

The sowing seeds and their timing is important to women. Not all persons are allowed to sow seeds. There are certain persons within the household or neighbourhood who have the reputation that if he / she sows the seeds then the result will be good. Sometimes they also allow well-behaved children to sow seeds. A good personality is

deemed to indicate that the result will be good. Timing is an important factor in making decisions. They never sow seeds in the morning. They sow them in the late afternoon when the sun is going to set. They believe that if they sow in the morning, the vegetative growth of plants would be more than reproductive growth. This because the sun behaves like this, it runs throughout the day.

In case of afternoon sowing, the plant will restrict its vegetative growth after a certain period and give more or better fruit. This is the culture of symbolism. They believe that travel of the sun is the symbol of plants' vegetative growth and when this travelling ceases, that is dark phase of the day, which is the symbol for fruiting. As well as this belief, they do not sow any seeds on the *Purnima* (full moon day) or on the *Amabassya* (day without moon). They think that there are certain physical problems (such as arthritic pain, uneasiness, etc) with the human body on these days and this is similar to a plant's body. They say:

> *Bate ghate bona hole, fosol hoi na kadi kale.*
>
> "if you sow any seeds when you have arthritic pain or expect pain, your crops will never be productive".

Moreover, if they have the experience of someone dying after cultivating a certain variety of a crop, they think that it is bad for them to grow it and they will never grow that variety again in their homestead believing that someone could die. So in making cropping decisions, the women of the studied village take note of these beliefs and sow seeds accordingly.

Women have many technical skills. Men also apply some of these techniques when cultivating field crops. Homestead gardens are purely organic gardens. In this village, every morning women are supposed to clean their homestead-yard with a broom. After

cleaning their yards, they deposit the waste on the soil, in a specific e.g. in a pit, thinking that it will produce very fertile soil to use at the base of trees and shrubs. They, also, pour fish-washing water on their crops. Women also prepare organic manure and composts from their cow dung and kitchen vegetable residues. Most women soak seeds for their crops in kerosene before sowing to protect them from insects and pests. They use kerosene also when they find any insect infestation of their crops. When they find any *teolka* (a viral disease) on their chilli crop, they use *panta pani* (fermented rice water) on it. They also use filtrates from tobacco leaves to stop pest attack on their crops.

Other methods are used for increasing vegetable yields. The stems of bottle gourd and pumpkin vines are given a longitudinal incision, which, ultimately, helps the plant to bear fruits. They cut the top off male papaya plants in their home garden to promote new branches that bear fruits without seeds. It has a different taste from that of the female plant. They hang earthen pots painted in black and white on vines or grow an arum plant in the middle of the plot of *potol* crops to protect from the devil's eye on their crops (Figure 7.2).

Figure 7. 2. An arum plant in the middle of a *potol* garden.

Sillitoe (2000a) reports the same practices of Bangladeshi farmers elsewhere. Scientists and extension workers may consider such practices as ignorance, but these practices have a great cultural value. This cultural practice is followed in their daily work and is inseparable from their other activities. The following section discusses the influence of home garden crops on field crops. Farm families organise their livelihood in such a way that everything works together (Ellis, 1988; Gill, 1991). Both home gardens and fields are not disconnected rather they are complementary to each other. Home gardens have both direct and indirect influences on the field crops. Firstly, valuable products from the homestead area, like fruits, timber and certain vegetables are marketed and men use the money planting for their field crops. Secondly, families do not have to buy any fruits; vegetables, spices, or firewood from the market as they produce these in their homestead areas. This saves money for field crop investment. Women earn some money selling their surplus to their neighbours or in the market and while sums are not great, they gradually accumulate to a valuable amount. They often hide this money from their husbands to buy cosmetics, utensils, and things for their children. However, during hard times, when farmers are desperately seeking for money to buy fertilisers and insecticides to save their crops, women will give them money from their own savings. Although the amount may not be so large, however, its timing is crucial, otherwise farmers have either to borrow money from moneylenders and pay high interest rates or borrow it from their patron landlord, which increases clientage. It could take time to get the money from the landlord and consequently, crops may suffer. So the small sums of money accumulated by the women may help to save crops in crisis periods. Otherwise, farmers may have to sell either their cattle or land to survive a crisis, which may bring more problems in the future. Several social anthropologists have illustrated the diversity and complexity of their livelihood and survival strategies (Gulati, 1981; Breman, 1985; Beck, 1994; Scoones, 1995).

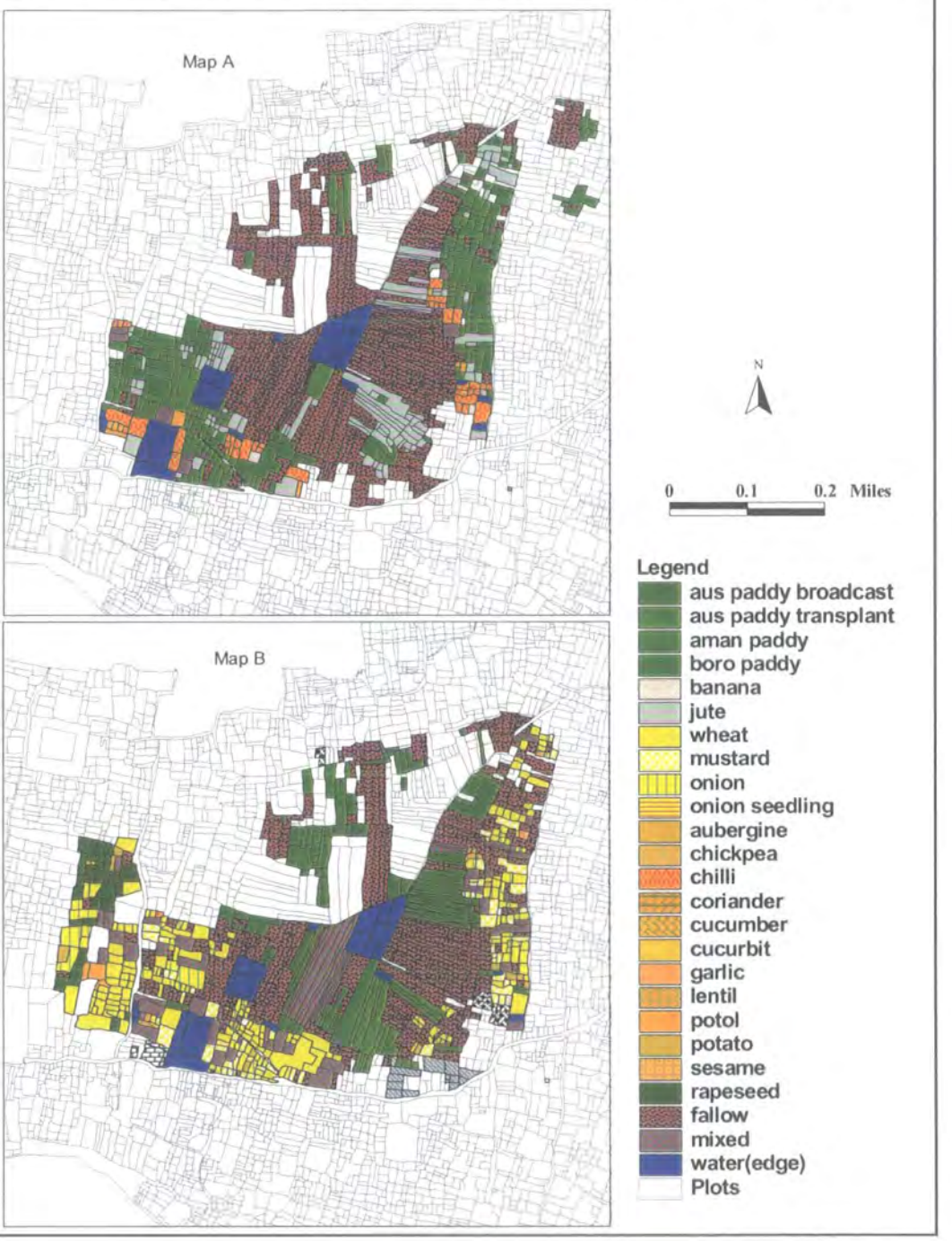
From the above discussion it is evident that home gardens play an important role in rural livelihoods, which development practitioners rarely acknowledge. In garden cropping decisions, women play an important role which also influences the decision making process of field crops.

7.2.2 Field Crops:

On the floodplain more than 80 per cent of land is under field crops. This section will explore how farmers make their decisions when choosing field crops. The crops to be cultivated are selected on the basis of the soil-plant-water condition of plots. The *kharif* season is characterised by high soil moisture or flooding. Then the growing of rice and jute predominates. Other crops cannot tolerate the excessive soil moisture. The *rabi* crops are greater in number than the *kharif* crops and are grown in areas of adequate residual soil moisture or where irrigation facilities exist. A list of the crops grown in the Ujankhalsi village areas is given in the appendix (Appendix **1;** also see figure 3.2 p56). The survey of plot to plot cropping patterns of the Padma *beel*[1] in the *aus* and *boro* agricultural seasons during 1997-98 reveals that rice predominates in both seasons (Figure 7.3). From this figure it can be seen that in the *aus* season a small number of crops are grown in comparison with that of *boro* season. Jute and *aus* paddy dominates in this season. This is because in this season low lands are unsuitable for cultivation. As farmers are not growing deepwater *aman* paddy, most of the *aman bhuin* remains fallow. On the other hand, farmers cultivate most of their *beel* land in

[1] This plot-to-plot survey was conducted by the natural scientists employed on the LWI Project. In the figure the land use appears to show a significant portion of fallow land. Data were not available on those blank plots. There are thousands of plots in the Padma *beel* area and it was difficult to collect and monitor data from all these plots every fortnight (which LWI did). To represent and maintain data perfectly, LWI researchers used a transect method and carried out their crop monitoring over 18 months. This is why there remain significant blank portions. I gratefully acknowledge their permission to use these data.

Figure 7.3 Showing crops cultivated in Ujan Khalsi villages in Aus (Map A) and Boro (Map B) seasons



the *boro* season. HYV *boro* paddy and onion dominate in this season with a small number of other crops (Figure 7.3). Farmers characterise each cropping season by a number of ecological variables with which they are well acquainted (Richard, 1985, 1989). The knowledge they bring to their activities is not generalised, rather it enables farmers to make effective use of their own awareness of the specific micro-environmental conditions of each plot.

7.2.2 1 Choice of Crops:

Rice is the major food crop of Ujankhalsi like other Bangladeshi villages. It is grown extensively throughout the region on plots ranging from those on high land to deeply flooded low land in all cropping seasons. It occupies 80 per cent of the cultivated area and constitutes 75 per cent of the total produce of all field crops (Rashid, 1991). Bangladeshi people are content to take their three meals with rice as is their custom. Some people include wheat *Chapati* in their meals but this is a poor family's meal. In Bengali culture to buy rice or wheat from the market is shameful for a farmer, as it indicates that he is poor or else not an inefficient farmer. Other crops, like onion, banana, chilli, papaya and jute are popular as cash crops with farmers in this village.

Crop choice depends on the mental map of the farmer involved and the opportunities available to him. In making farming decisions, farmers have to consider several things. In the floodplain, farmers have lands, which differ in size and elevation and also in terms of fertility status. They have a number of crops of different cultivars, suitable for theirs plots in different cropping seasons. Farmers, also, have different livelihood requirements. For example, they need food grains, vegetables, fruits, and spices to satisfy their food requirements and cash to meet their other family expenses (Heyer, 1989). Farmers consider all these issue, when making their crop plans. The type and extent of their plans depend on their family's situation.

Farming decisions in risk prone areas, such as the floodplain, are very complex. Farmers have to consider several factors when they construct their cropping patterns. Their internal arrangements are complicated, so it is very difficult for an outsider to understand the situation fully. Wealthier farmers' capabilities are different from those of poorer families and their requirements differ but livelihood plans also vary from family to family of the same economic position. Crop planning will not be similar in each year, it may differ year-to-year depending on the ecological and socio-economic situation of the families. Personal efficiencies with different crops and their perceptions cause farmers to make different decisions. In practice, as I observed, cropping decisions do not appear to be the same for any two families with more or less the same economic strength.

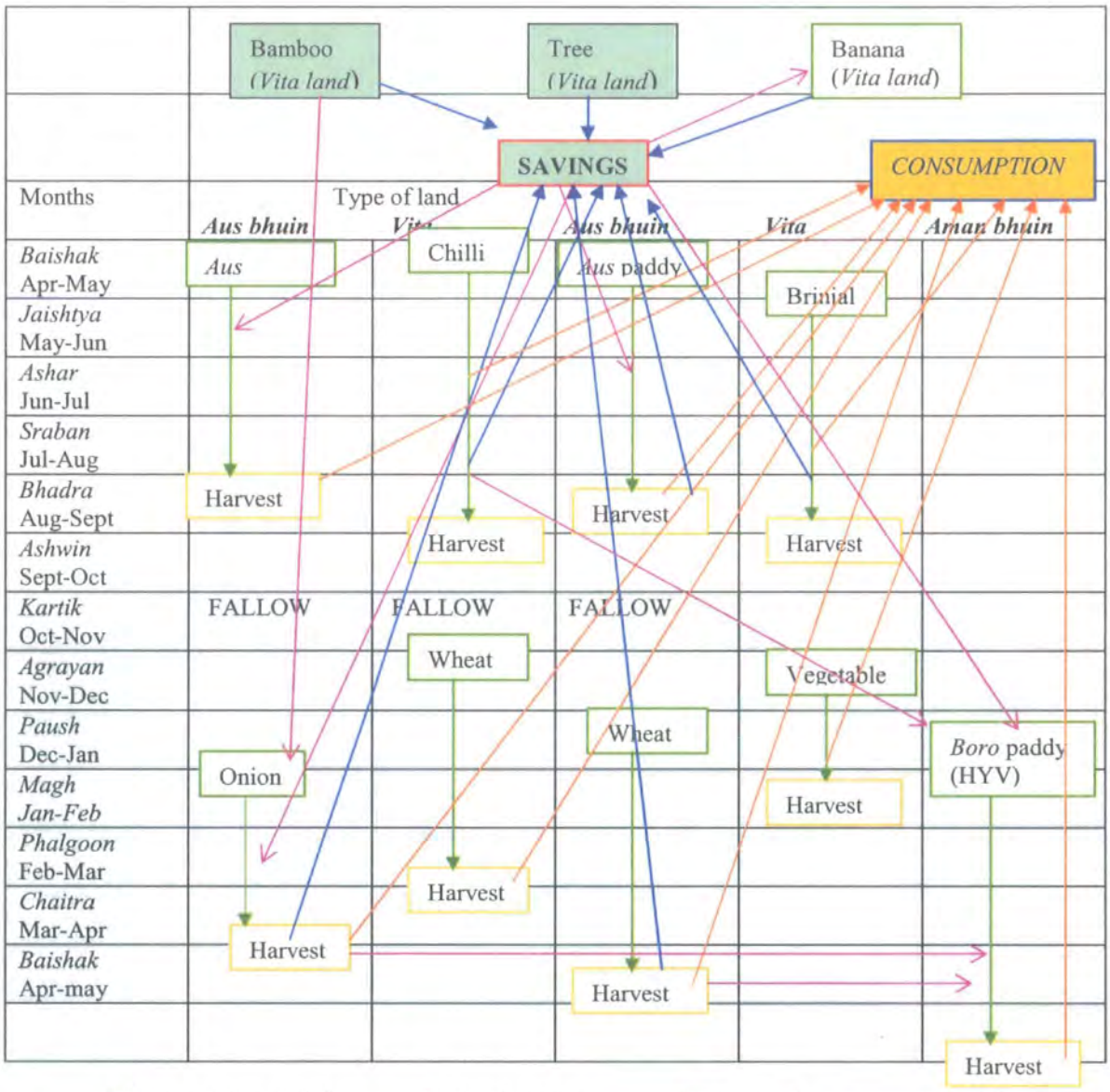
Tajimuddin, a small farmer, has 2 *bigha* (66 decimal) of land of his own with a further 3 *bigha* that he sharecrops from his brother-in-law. He is known as a good hardworking, farmer. Figures 7.4a and 7.4b show his crop plan for 1998. When he first drew this plan it appeared, very complicated. He planned his plots and set up his plan in such an efficient way that he could manage his subsistence throughout the year and also to earn money to manage other crops in subsequent seasons. He, also, set aside some money to improve his economic state. By the end of 1998-99 cropping year, he had made 11, 000 TK (72 TK = £1) which he used to take over *kot* on a piece of land and started a small business selling husked rice in the local market. He changed his cropping pattern for the next year (1999) and cultivated chilli instead of papaya (plot 3), banana instead of chilli (plot 5) and aubergine (plot 7).

Another farmer's crop plan with more or less the same economic condition may be different. Aiub, is a farmer with almost the same area of land under his cultivation as

does Tajimuddin (2.5 *bigha* of his own and 1.5 *bigha* as a sharecropper). His cropping decisions, however, are different. He wished to produce grain from his own fields and onion to fulfil the landlord's requirements. In another situation, Aiub took a pond lease for fish cultivation for three years. Basically, his main intention was to invest more in the pond, as he expected to get a good return from there (Figure 7.5a and 7.5b.). On the other hand, Tajimuddin was more interested in producing cash crops such as banana, papaya, aubergine, chilli, onion, etc. Crop choice varies between farmers. It depends on the mental map of the respective farmer, his economic condition and prevailing opportunities and constraints. Farmers may vary in the expertise in growing crops; their family's requirements and personal choices may also differ from that of others.

A farmer could decide on a set of crops to plant in a particular season. The question then arises as to how does he choose one particular crop or its alternative? Lancaster (1966, 1971) thinks farmers consider an alternative to have a set of characteristics or aspects, and an aspect can represent values along some quantitative or qualitative dimensions (e.g. price, capital, comfort). He assumes that when farmers use a continuous quantitative dimension or aspect, they either separate or categorise crops into a smaller number of categories. However, Miller (1956), Anderson *et al* (1977) moved away from above economic assumptions and argue that decision-making is more a psychological than a normative model. Sillitoe (1996b) describes that farmers of New Guinea do not think in standard economic terms when they are making gardening decisions. Their implicit knowledge allows them to make decisions, about what to grow and where, based on their cultural requirements which are holistic rather than economic.

Figure 7.4a Crop planning of a farmer (Tajimuddin) of Ujankhalsi village for the year of 1998.



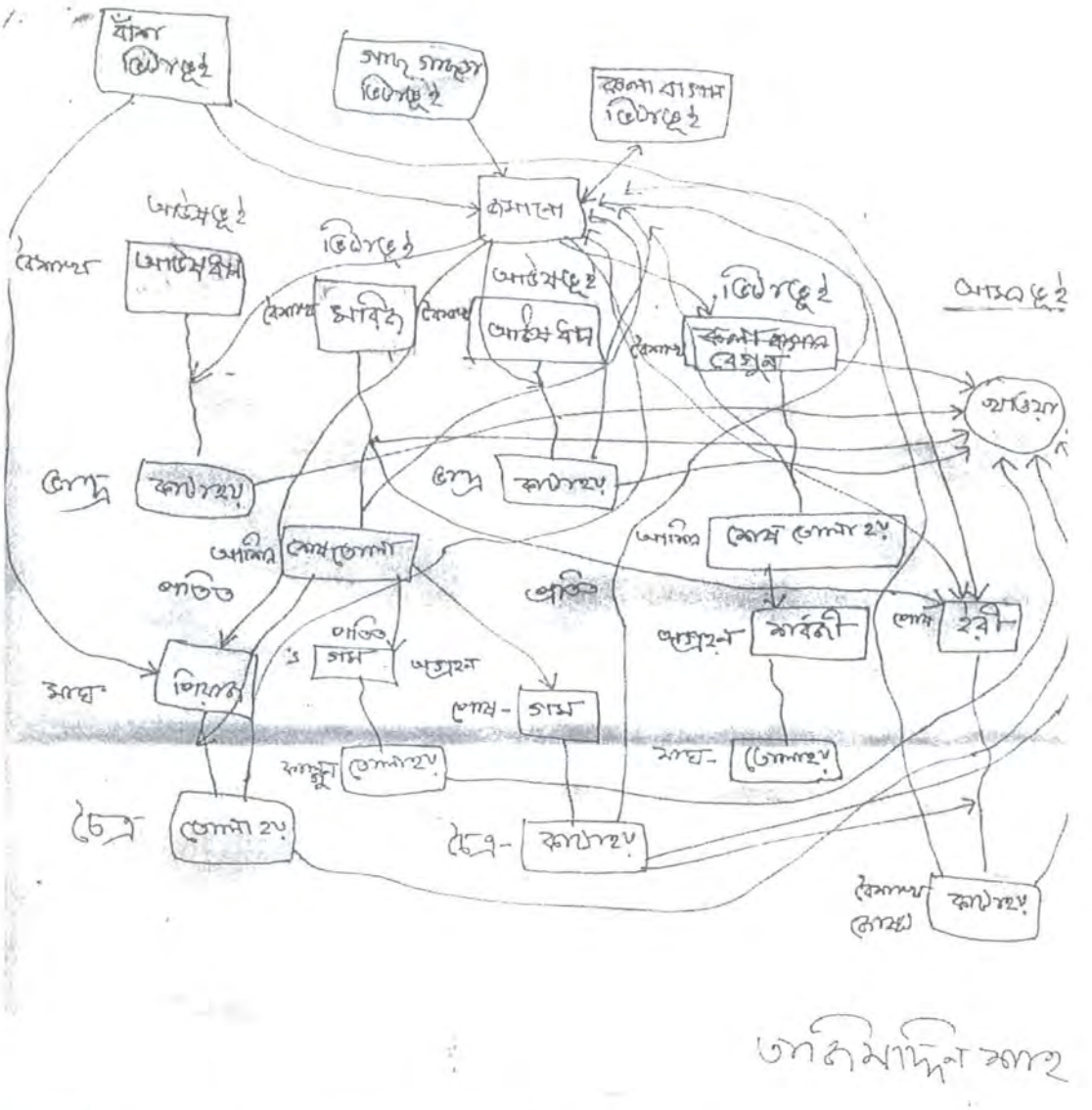
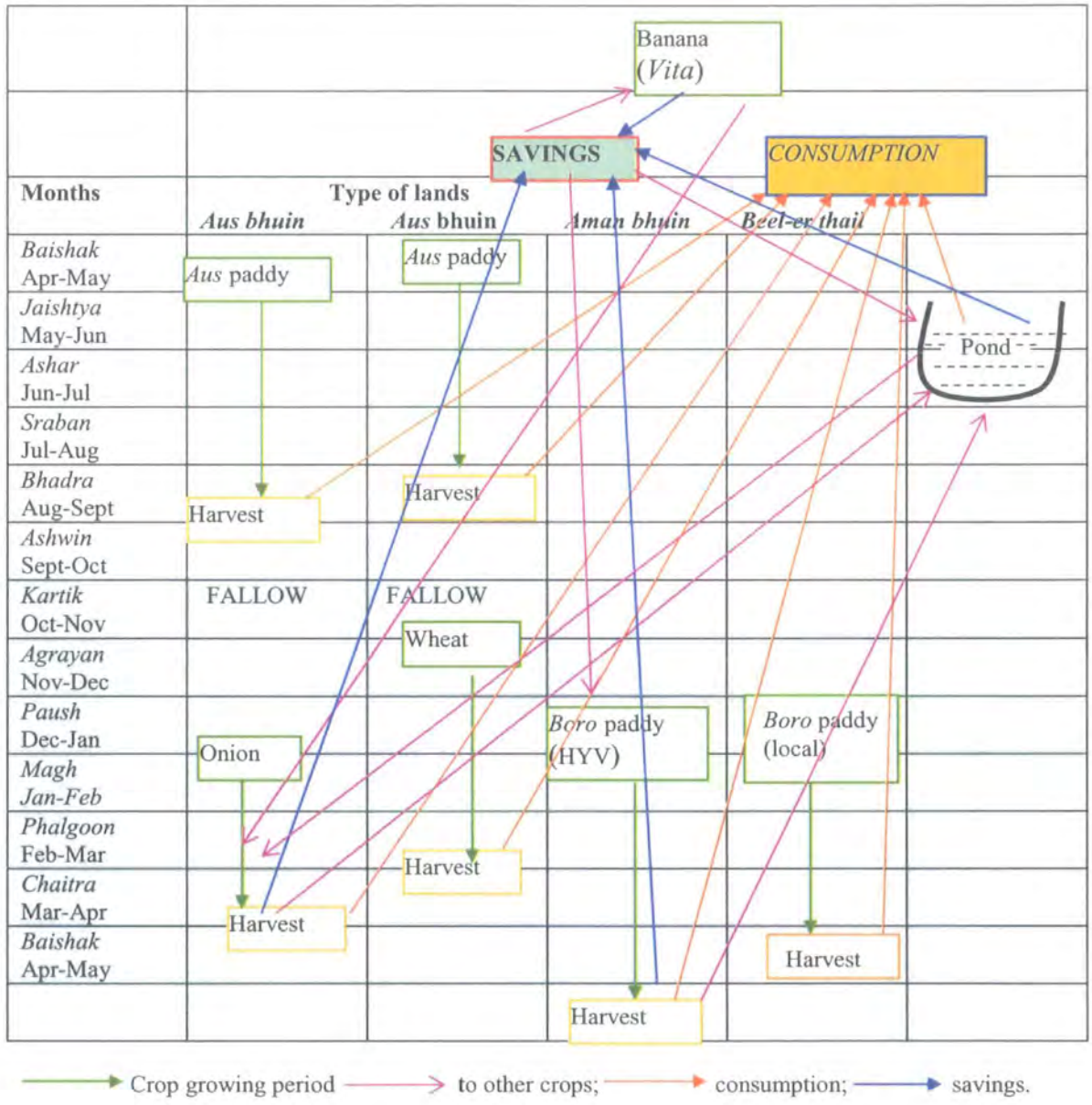


Figure 7.4: Crop planning of Tajimuddin (farmer's own drawing)

Figure 7.5a Cropping diagram of a farmer (Aiub) of Ujankhalsi village for the year of 1998.



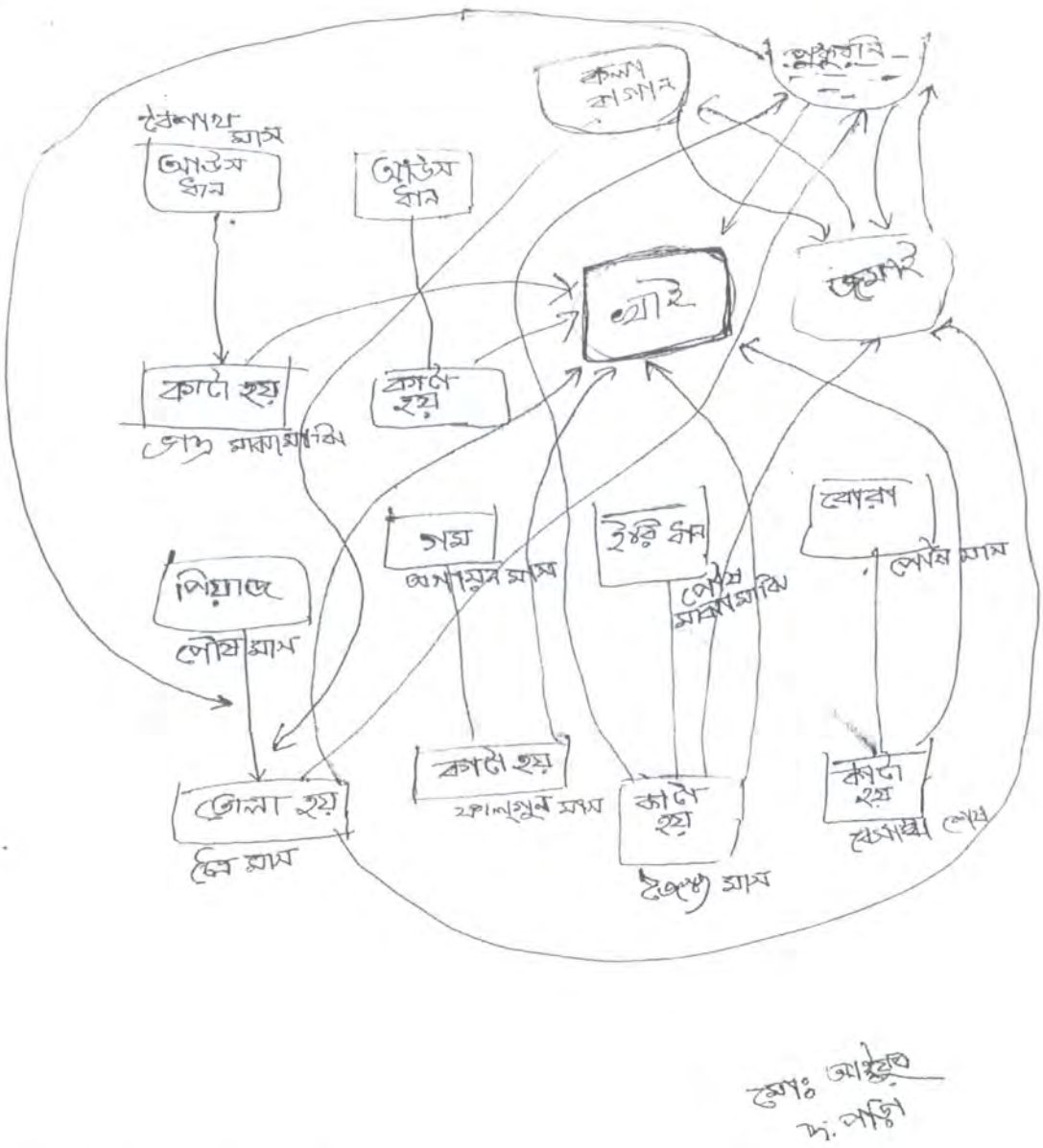


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Figure 7.5 Crop planning of Aiub (farmer's own drawing)

I agree partly with all of those contentions. Before choosing a crop, farmers consider both quantitative and qualitative factors e.g. availability of seeds and other inputs; prospective home consumption demands; their matches with other cropping patterns; the risks involved with particular crops, market demands, personal preference and, also, religious and ideological issues. They do not think in bits and pieces. They compose things as a whole until have a clear picture in their minds (an image). Most days of the year they work in the fields all day in bare feet and hands; they can smell their land; feel the microclimate of their plots through their bodies and souls. This enables them to experience conditions similar to those of their plants and their minds know, spontaneously, the suitability for a particular crop for particular time on a particular plot. This knowledge depends on their experiences. A analogy can be drawn with a bicycle rider who identifies himself with his vehicle and so avoids obstacles, mentally turning himself at the same time as physically steering his vehicle. He never thinks bits and pieces about his riding the cycle. From the past experiences, he has emassed knowledge which he then applies to the present situation. The Bangladeshi farmers go through a similar process identifying with the growing plant and making decisions collectively depending on conditions.

In their livelihood strategies, farm families need to satisfy certain social and economic requirements depending on their basic assets: their home, their lands and their crops. To fulfil their requirements, they choose suitable crops accordingly. Sometimes they make decisions together with others. One farmer may prefer one crop for one reason; another may choose the same but for a different reason. It depends on the context and content of their strategies. If we examine paddy, their main grain crop, we can see why they prefer this crop from different points of view and how those influence their cropping decisions (Table 7.1).

Table 7.1 Preferential comments regarding different varieties of paddy cultivated by farmers.

Varieties	Reasons for cultivating the variety	Problems faced during cultivation	Consumption point of view
Shany	Early, can grow in low fertile land, can tolerate drought in juvenile stage and later up to 3'- 4' floodwater, can be harvested before deep flooding period, resistance to pests.	Grasses grown in the land and take much labour to weed them out.	'King' of rice! Very nice to taste. Suitable for making *chira* (beaten rice), *pitha* and *khir* (rice pudding).
Gobra	Can grow in moderately flooded water (5'- 6'), long straw and used as good fodder, does not tip over earlier, moderately good yield.	"	Taste not so good as *shany*, bit harder, takes a long time to digest, suitable for *panta*.
Koijur	"	Grasses grown in the land and take much labours for weeding them out. Difficult to find seeds.	"
BR 1 (*Chaina*)	Can harvest earlier so lesser chance of damage by floods or hailstorm (storm avoiding variety); good yield; requires less fertilisers than other HYV varieties, grows well in those plots where previous crop was onion; seeds available locally as well as in the market.	Grasses grow in the plots which is costly to weed out, less drought tolerance, early flood and longer drought period may cause damage to the crop, not good price in the market, less resistence to pests.	Not very good for eating (bitter taste in cold state), grains do not expand enough when cooking (*bhate bare na*), not suitable for making snacks.
BR 26	Early, possible to harvest before flood in *aus* season and before hailstorm in *boro* season (storm avoiding variety). Good yield, long straw, good price in the market.	Panicles are not so strong so grains could detach easily by storm and flood; not resistance to pests and insects; requires much fertiliser and insecticide to attain expected yield.	Fine rice, although comparatively lower yield than BR 14 or BR 29 but fine for cooking, nice to taste.
BRP	Most suitable crop in *aus* season, can match well with *chaitally* crops (e.g. mustard, lentil); straw used as important fodder during the crisis period (monsoon); good price in the market; good yield but is reducing day by day; grain does not detached as easily as BR 26.	Not resistence to pests and insects, requires much fertiliser and insecticide to attain expected yield	"
Digha	Semi deep water *aman* variety; suitable crop of *aman* season in *digha bhuin;* also suitable for mixed cropping with broadcast aus paddy; can tolerate 5-7' flood water.	Area reduced significantly, not possible to grow within small area because floodwater can wash it away, difficult to get good seeds in the locality.	Fine rice, nice to taste, good cooking quality, feels heavy when eaten and takes time to digest.
Soli	Deep deep water *aman* variety; suitable crop in *aman* season in *soli bhuin;* also suitable for mixed cropping with broadcast *aus* paddy; can tolerate 8'-10' flood water.	Area reduced significantly; not possible to grow within small area because floodwater washes it away; attractive to birds and rats. Difficult to get good seeds in the locality.	Fine rice, smells and tastes good when cooked; so delicious that you end up eating too much; easily to digest; most desireable rice for entertaining guests Suitable for

Varieties	Reasons for cultivating the variety	Problems faced during cultivation	Consumption point of view
			making *khir, pitha* and other snacks.
Mita korol	Deep water *aman* variety; can be used for broadcasting with *aus* paddy and can grow with the rising of floodwater; can survive in floating condition.	Seeds are available in the locality; not possible to grow within small area because floodwater may wash it away.	Nice to taste, good for cooking; feels heavy when eaten and takes time to digest.
Boroamna	Deep water *aman* variety, can be used for broadcasting with *aus* paddy and can grow with the rising of floodwater, can survive in floating condition.	Seeds are available in the locality; not possible to grow within small area because floodwater can wash it away	Nice to taste, good cooking quality, feels heavy when eaten and takes time to digest.
Kalozira	Rainfed paddy, suitable for *danga bhuin*, nice to look at, soft and aromatic in nature.	Not suitable for lowland, tall, soft stem and prone to tip over; low yield; attractive to birds ans rats; difficult to get good seeds in the locality.	Suitable for cooking pilau[2] and *biriani*[3], used mainly for entertaining high profile guests; can eat huge amount and is easily digestable.
BR 11	Rainfed paddy, suitable for *danga bhuin* and *aus bhuin* in *aman* season; long straw; moderately good yield,.	Can not tolerate water more than one and half feet; often tips over which affect yield performance; difficult to fit with *chaitally* crops, sickly (e.g. susceptible to diseases) other more suitable varieties are not available here.	Less desirable for cooking and eating; grains do not expand enough when cooking; cooked rice does not last long because it becomes watery and spoil quickly. Not suitable for making *pitha* or *khir*.
BR 22	Rainfed paddy, suitable for *danga* and *aus bhuin* in *aman* season, good fodder, good yield	Cannot tolerate water more than one and half feet; difficult to fit with *chaitally* crops; 'sickly' (e.g.diseases); new in this area.	Hard, less desireable for cooking; grains do not expand enough when cooked; one does not have to eat a lot to be full. Not suitable for making *pitha* or *khir*
Shaita boro	Possible to grow in waterlogged conditions (normally not possible to grow other crops); requires no fertiliser, insecticide; large grains; moderately good yield.	Early flood could damage the crop because land goes under water quickly.	Nice to taste; it is hard, feel heavy in the stomach and takes a long time to digest. Suitable for preparing *panta* (fermented rice).
BR 10	Good yield, storm tolerate (i.e. panicles are strong and grains do not drop out easily), easier to care for during dry season, seeds available in hands	Requires much fertiliser and insecticide, difficult to thrash because grains are difficult to detach from the panicle.	Not good cooking quality, rice does not expand when cooked, it is hard and dose not have to eat a lot to full.
IRRA TOM	Good yield, easier to care for during dry season; good market price;seeds available locally.	Requires much fertiliser and insecticide; panicles are not so strong as BR 10 and grains can detach during	Not good cooking quality, rice does not expand when cooked.

[2] A dish of rice cooked with butter and spices.
[3] A dish of meat and rice cooked together with butter.

Varieties	Reasons for cultivating the variety	Problems faced during cultivation	Consumption point of view
		heavy storm.	
BR 14	Good yield; easier to care for during dry season; good market price;seeds available in the localy.	Requires much fertilisers and insecticides; panicles are not so strong as BR 10 and grains can detach during heavy storm.	Good cooking quality, though rice does not expand when cooked
BR 29	Very good yield; good market price,	Susceptible to diseases; requires much fertiliser and insecticide; panicles are not strong as BR 10 or IRRA TOM and grains can detach during heavy storm	Not very good eating quality, grains are not firm when cooked.
BR 36	Very good yield; good market price	New in this locality; not as well known as BR 10, or BR 14; seeds not easily available.	Not good cooking quality, too soft.
Aloke 6201	Highly advertised variety but not very good yield; attractive plants.	Requires intensive care and need optimum amount of fertiliser otherwise it produces chaff without grain.	Not good cooking quality, too soft. Water comes out within couple of hours after cooking.
Loknath 503	Highly advertised variety but not very good yield, attractive plants.	Require intensive care and need optimum amount of fertiliser otherwise it produces chaff without grain.	Not good cooking quality, too soft. Water comes out within couple of hours after cooking.

This table indicates how farmers may choose different varieties of paddy according to their needs. All varieties do not grow in all seasons and are not suitable for all types of land. Farmers have to weigh up their requirements, environmental factors and the availability of certain varieties. From the above discussion it is also evident that, to some extent, the opinion of different group of were similar. For example, early maturing, low resistance to pests, high yielding nature, cooking quality, etc. differs according to their variety and attractiveness to the growers.

Rich farmers consider *kalozira as* delicious, excellent quality and like to grow it on some on their land. However, though poorer families like this variety but are not interested in growing it on their lands. It is low yielding; too soft; wasteful - a large amount is needed to satisfy the appetite and it is digested within a short time. As they

work hard in the fields, they need heavier rice that takes longer to digest such as BR 10, IRRA TOM or *Shaita boro* that are popular with them. Moreover, they have not the means to entertain their guests with *pilau* and *biriani*, which require fine rice. These poorer families cook meals either once or twice a day and eat cold food at other times, so they prefer those rices that do not spoil quickly. They also eat *panta* (fermented rice) for breakfast, and so choose varieties suitable for making *panta*.

On the other hand, rich farmers instead of taking *panta* eat warm, freshly cooked fine rice for breakfast. They cook coarser rice for their labourers, signifying also their social position. To use coarser rice in their daily diet means both ordinary people and the rich are sensible to these social divisions. The rich do not want to be 'ordinary people' and place different varieties of rice as first-class or second-class, implying for first or second-class people. They have enough land and choose some 'first class' varieties for their own consumption and some 'second class' for other uses. Nazarae-Sandoval (1995b) illustrates a similar attitude among rich farmers in cultivating crops such as sweet potatoes, rice, etc. in the farming communities of Kabaritan, in the Philippines.

The above discussions are on the basis of farmers' gastronomic behaviour. They perceive those through their experience and requirements. Operational realities may differ due to economic and environmental factors (discussed in earlier chapters). They have different requirements and they try to satisfy them by carefully selecting suitable varieties. For example, if a farmer has three plots for growing paddy and three varieties of paddy are available of which 'a' is better than 'b' and 'b' is better than 'c' in terms of yield, it does not mean that the farmer will grow 'a' in all of his three plots even if all other factors are favourable. He may choose 'c' or 'b', or both, for his plots. The

choice will depends on his requirements, capability and interest (Sen, 1982). The social choice is different from the economic calculation, as the social standing and particular choice of families may get preference, as in the case of the choice of rice by wealthier farmers or choice of a personal farmers as we have seen in cases of Tajimuddin and Aiub who are within same social categories.

Beside rice, for other crops like, banana, different farmers have different attitudes towards them. Nowadays rich farmers are not much interested in growing paddy on their suitable lands due to labour shortages. It becomes unprofitable for them to cultivate with hired labourers. Banana, a popular cash crop, grows on flood free land. It requires comparatively little labour and farmers can get money when they harvest it (once a year). Rich farmers like to grow banana on their *vita bhuin*. Poorer farmers are not too interested in growing this extensively. They, normally, have access to small areas of *vita bhuin* on which they grow crops such as chilli or aubergine that they can harvest weekly and so earn cash so that they can manage other crops with this cash.

This can be illustrated by relating the views of a rich and a small farmer:
Samjan, a rich farmer stated:

> "...on my vita I have planted 170 banana suckers and I hope to get the same number of *chora* (banana bunches). If I sell each bunch for 100 TK, which is possible, I'll earn 17,000 TK from this plot at harvest. Although it requires a large amount of fertiliser and pesticide but banana demands less labour, so I save money and trouble and the profit is good. Other crops, such as paddy, chilli, aubergine, etc. require much more care and labour to manage them and so they are less profitable for me."

Jamal, a small farmer, had a different view of his *vita bhuin*,

> "... this plot is suitable for *kola* (banana) and other cash crops but I prefer to grow *morich* (chilli) because the maintenance cost is comparatively lower and it is possible to take more than two crops in a year with this crop. On the other hand, *kola* (banana) needs one year to mature and it is not possible to grow other crops before it is harvested. I've only two *vita bhuin* and I need to harvest three crops from this plot. Moreover, I can harvest *morich* twice a week and sell it in the market, thus giving me a steady income. From this money I can manage my family expenses and inputs for other crops. If I grow *kola*, I could get more money at the end of the year, but I could not manage my other crops properly which must affect my strategies."

Availability of labour is a problem for Samjan. Due to his social position, he cannot work in fields like Jamal, but he has no financial problem like Jamal. So he selects *kola* for his *vita bhuin*. Moreover, being a rich farmer, to sell *morich* twice a week in the market by himself is not prestigious for him but he is proud of selling *kola* from his garden. On the other hand, Jamal has no labour problem. He works for himself and hires labour if it is necessary. Being a small farmer, he also needs steady income to meet his living expenses and the cash for managing other crops, he prefers *morich* to *kola* for his *vita bhuin*.

Jute is another cash crop. Until late seventies it was the main cash crop in Bangladesh, its fibre was known throughout the world as the 'golden fibre of Bangladesh'. At that time Bangladesh exported more than 70 per cent of world's requirements (Chowdhury, 1998). After the discovery of synthetic fibre, the market declined and it became an unprofitable crop for farmers. Nonetheless, it remains a suitable crop on the floodplain during the monsoon as it can tolerate more than 4 feet of floodwater. Farmers grow it

on high to medium low land. Farmers of Ujankhalsi village use this crop to improve soil quality for their onion fields. Now farmers cultivate it mainly for domestic use. However, to some farmers, this is still valuable. Soleman, a medium farmer, explains why he grows jute how this crop complements to his betel (*paan*) garden:

> ".. I need a large number of *singoit* (the jute sticks without fibre - Figure 7.6a)) for fencing the garden. The *paan* (betel plants) need sticks to climb up (Figure 7.7a and 7.7b) and I use *singoit* for these sticks. My wife also prepares *nanda* (cow dung sticks for fuel) with these sticks, finally I can sell the *pat* (fibre). The crop is useful to me in many ways."

From the above illustration, it is clear that farmers select different crops according to their economic needs and their social positions. In making cropping decisions, they consider affordability and suitability of crops both socially and economically. These varied aspects of decision making processes is absent in some models or decision making trees (Castle *et al.*, 1987; Harling and Quail, 1990; Jofre-Giraudo *et al.* 1990; Fujisaka *et.al.*, 1996 and Ohlmer, 1998). We need to understand both the cognitive behaviour of people and local ecological reality to able to understand the decision making process.

As it was observed in Ujankhalsi, as long as the household events go all right i.e. have not had any unexpected expenses, farmers follow their normal cropping strategies. Farmers change their cropping decisions in special circumstances. For example a household may choose more cash crop before building a new house or buying farm equipment such as shallow tube well, or a power-tiller; in this case the farmer may intensify crops such as banana papaya and onion. Or if one marries off his sister or daughter, he might need some cash for the dowry and, in that case, he would prefer to

Figure 7.6 Farmer is separating jute fibres and sticks from the plant.

Figure 7.7a Betel garden (outside view)

Figure 7.7b Betel plants climbing with sticks

grow more cash crops. If he will have to offer meals to the villagers on an occasion, such as marriage ceremony, *khatna* etc. he may intensify more grain crops. All these cases require more income or production than is required in a normal situation and consequently farmers change their decisions.

7.3WHY FARMERS ACCEPT OR REJECT CROPS

The floodplain comprises an area of rich crop diversity. Farmers need a number of alternative crops from which to make choices in this risk prone climate. Farmers prefer certain varieties of crops (Appendix 1). Some crops are no longer grown due to unpopularity with farmers. This section discusses current attitudes of farmers to different varieties of crops. The Bengali farming community, in the main, produces its own seeds. Sometimes farmers have to buy these from the market or borrow from friends or relatives. This section also explores the consequences of some development interventions on farmers' crop choice.

In Ujankhalsi village, after paddy, the most popular crops are wheat, jute, onion, banana, papaya, chilli and beetle leaf. Each crop comprises a number of varieties, of which some are local and others introduced as high yielding varieties by the Agricultural Extension Department (Appendix 1). Each variety has its value from a socio-cultural and economic point of view. Officials of the Extension Services are interested in introducing more crops, other than paddy, without protecting local varieties, which are ecologically well adapted. They are interested in 'saving' people from the danger of rice monoculture. On the other hand, other departments of the government are interested in promoting the cultivation of more rice in the dry season. The Bangladesh Rice Research Institute (BRRI) since 1966, has been releasing

different new varieties, developed by their researchers, to secure greater production. So there exist contradictory attitudes between different Government department and agencies. As rice is central to the livelihood of rural people, it seems foolhardy to increase the cultivation of other crops at the expense of rice. This does not mean that farmers are not interested in cultivating other crops, it depends on ecological, economic and socio-cultural factors as referred to earlier.

What is the farmers' attitude to newly introduced crops? Farmers have a number of crops to grow, which are tested and adapted to their local environment. They have great expertise with some of them and are keen to grow them. In recent years, farmers of Ujankhalsi have experienced with some 'improved' varieties of different crops. They have accepted some and rejected the others.

Onion is the most popular cash crop among farmers. Farmers of the Ujankhalsi area produce one of the best qualities of onion in Bangladesh which is *Kalashnagar*, a local variety. They can produce about 50 to 70 *monds* (2000 kg to 3200 kg) per acre a year and can store it in-house for more than 8 months and sell it when the price goes up. Once the Department of Agricultural Extension was interested in introducing a HYV variety. Farmers rejected it after one or two years of cultivation. The main reason for its rejection was that they could not store it for long periods. It started to deteriorate within a month of harvest. It was less profitable for them and the yield was no better than the local variety.

Banana and papaya are two other important cash crops in the village. Farmers are now cultivating the HYV varieties as field crops. Fifteen years ago, they did not think of growing them outside the homestead. They have local varieties that taste better but are

less productive and attractive. Farmers are interested in growing these in their homestead garden for their own consumption and will sell any surplus. The HYVs are in great demand in urban areas and in the international market. Businessmen, from the capital, come into the village or local market to buy these banana and papaya and farmers receive a high price for them. On the other hand, the Extension Department has tried to 'push' sunflower, soybean and maize for the last ten years but has failed largely. These are new crops to the farmers. Moreover, there is no established market in the locality for such crops. The people are also not interested in changing their food habits and so do not accept these crops.

Farmers are receiving offers to set up demonstration plots for modern varieties of rice (Figure 7.8). They tend to get good results on the demonstration plots, due to their controlled environments, but most varieties fail in open fields. Table 2 lists HYV rice varieties, which have been released by the Agricultural Extension Department in Rajshahi region.

Table7.2 indicates that that the BRRI released about 27 HYV varieties and certified four more Hybrid[4] varieties (Aloke-6201 and Loknath-503) since 1967 in Rajshahi region. Twelve of these varieties are found in Ujankhalsi. During discussions most farmers agreed with some features, such as early maturing, storm resistant, etc. Newly introduced varieties have a better yield performance than the older ones. However, farmers are still growing some of the older varieties such as BR 1 (China), IRRATOM,

[4] HYV means High Yielding Variety. 'Hybrid seeds' also high yielding in nature and is much more productive than HYVs (as claimed). The main difference is - from HYV seeds farmers can preserve seeds for their next cropping seasons but from Hybrid seeds, farmers can not. They are either sterile or very less productive. Farmers have to buy new Hybrid seeds every time of planting if they want to grow them successfully.

Figure 7.8 Demonstration plot in a paddy field, organised by a farmer with the help of Agricultural Extension Services.

Table 7.2 High Yielding Varieties of Rice released in Rajshahi region.

Name of the varieties	Growing season (s)	Year of release by BRRI* in Rajshahi region	Are farmers still growing this cultivar?
IR 8	*Boro, aus*	1967	No. Yield reduced significantly; better varieties available in the locality.
IR 5	*Aman*	1969	No. Yield reduced significantly; massive infestation by pests and diseases; better variety available locally.
IR 20 (*Irrishail*)	*Aman*	1969	No. Yield reduced significantly; susceptible to pests-insects; seed dormancy affected farmers significantly.
****BR 1 (*China*)**	*Boro, aus*	1970	Yes. Early variety; can tolerate up to 2 feet flood depth; can be harvested before deep flood in *aus* season and before hailstorm in *boro* season. Yield is moderately good.
BR 2 (*Mala*)	*Boro, aus*	1971	No. Yield reduced significantly, better cultivars available in the area.
BR 3 (*Biplab*)	*Boro, aus,*	1973	Yes. rarley in Ujankhalsi, Yield reduced significantly.
BR 4 (*Brrishail*)	*Aman*	1975	No. Yield reduced significantly; better cultivars available locally.
IRRATOM	*Boro*	1975	Yes. Popular in Ujankhalsi Panicles are strong enough and less

Name of the varieties	Growing season (s)	Year of release by BRRI* in Rajshahi region	Are farmers still growing this cultivar?
			affected by storm; yield is adequate.
BR 5 (*Dulhabhog*)	*Aman*	1977	No. Yield reduced significantly; massive infestation by pests and diseases; stem so weak often tip over.
BR 6 (IR 28)	*Boro, aus*	1977	No. Yield reduced significantly.
BR 8 (*Asha*)	*Boro, aus*	1978	No. Yield reduced significantly..
BR 9 (*Sufala*)	*Boro, aus*	1978	Yes Not found in Ujankhalsi.
BR 10 (*Progoti*)	*Boro*	1980	Yes. Popular in Ujankhalsi Panicles are strong enough and less affected by storm; good yield; needs less care.
BR 11 (*Mukta*)	*Aman*	1980	Yes. Yield decreasing year after year; often tips over, which affect yield performance. Area have been reducing due to insect and disease susceptibility. Other suitable varieties are not available so they stick to this variety.
BR 12 (*Moyna*)	*Boro, aus*	1983	No. Yield reduced significantly, better cultivars available now.
BR 14 (*Gazi*)	*Boro, aus*	1983	Yes. Yield is decreasing day by day. Less infestation by pests; good cooking quality, panicles are not so strong as BR 10 and grains could detach during heavy storms.
BR 15 (*Mohini*)	*Boro, aus*	1983	No. Yield reduced significantly; better cultivars is now available.
BR 16 (*Shahibalam*)	*Boro, aus*	1983	No. Yield reduced significantly; better variety is available now.
BR 19 (*Mangal*)	*Boro*	1985	No. Yield reduced significantly; better variety is available now.
BR 20 (*Nizami*)	*Upland aus*	1986	Yes. Very few in Ujankhalsi; needs much seeds to get sufficient seedlings.
BR 21 (*Niamat*)	*Upland aus*	1986	Yes, but not suitable for floodplain, not found in Ujankhalsi.
BR 22 (*Kiron*)	*Aman*	1988	Yes, few in Ujankhalsi. Good is yield; high infestation of insects and pests. Not possible to fit with *chaitally* crops (like mustard, lentil or vegetables)
BR 23 (Dishari)	*Aman*	1988	Yes . Not found in Ujankhalsi.
BR 26	*Aus, boro*	1994	Yes, very popular. Early, possible to harvest before flood in *aus* season and before hailstorm in *boro* season (storm avoiding variety). Good yield; long straw; fine rice; good cooking

Name of the varieties	Growing season (s)	Year of release by BRRI* in Rajshahi region	Are farmers still growing this cultivar?
			quality, good price in the market.
BR 28	*Boro*	1994	Yes. Very popular in Ujankhalsi. Good yield; panicles are not strong and vulnerable to storm; good price in the market; requires great care.
BR 29	*Boro*	1994	Yes. New in Ujankhalsi, very good yield; good market price; no problems are interested in BR 28 and BR 14 which have been tested.
BR 36	*Boro*	1995	Yes. Newly introduced; not widely tested; seedlings have cold tolerance; suitable for *boro* season, good yield.
BRP	*Aus, boro*	not known by BRRI scientists but widely cultivated by Ujankhalsi farmers.	Panicles are not strong enough and affected by storm, good yield. rice fine and of good of taste, good market price.
Aloke 6201 (Imported from India by ACI)	Boro	1998	Yes. Very new (1999) in Ujankhalsi. Yield was not satisfactory huge chaffs without grains.
Loknath 503 (Imported from India by Macdonalds International)	Boro	1998	Yes. Not found in Ujankhalsi but found in neighbouring villages, not satisfactory yield, huge chaffs without grains.
Sonar Bangla-1 (Imported from China by Mollika Co.	Boro	1998	Yes. Not found in Ujankhalsi area.
BRRI Hybrid-1	Boro	1998	Yes. Not found in Ujankhalsi area.

Source: Miah and Mannan (1989), Rajshahi regional BRRI Office, Agriculture Extension Office of Durgapur Thana and local farmers.

* Bangladesh Rice Research Institute (BRRI); Government authority to certifiy rice varieties for the farmers.

**Varities cited in 'bold' characters were found in Ujankhalsi or its adjacent villages.

BR 10, etc. They perceived *chaina* as having flood and storm avoidance due to its early maturation. IRRATOM and BR 10 are storm resistant varieties due to their strong panicles. These were released a long time ago and have proved successful. They have adapted well to the local environment and so farmers have accepted them. They rejected several other varieties due to low resistance to pests and insect, poor yield performance, etc. BR 20 also suffers from a seed dormancy problem and farmers need to sow large number of seeds to get good result. BR 11 suffers from infestation by

pests, lodges easily and fits poorly in with the next cropping season. However, as there is a lack of a suitable alternative variety for this season (*aman* season), so they have to grow it. All these difficulties have meant that some HYVs have failed to create the desired impact on the total production of rice in the area.

Normally, farmers of Ujankhalsi collect their seeds from plants in the middle of a plot. They talk of these plants as being 'mothers' surrounded by other family members. The seeds from 'mother' plants are pure. They have found, from their experiences, that seeds from the edge of a plot have large variation, which is not desirable for farmers. Those varieties also do not have a good price in the market. Mende farmers have similar experiences as discussed by Richard (1994).

In developing HYV varieties plant breeders make crosses between distantly related varieties with desired characters. As rice is a largely self-pollinated crop, few plants in the periphery region cross-pollinate and vary in the next generation. But the farmers of Ujankhalsi harvest seeds from the self-pollinated zone as a symbol of their use of 'good' seeds. By doing this, however, the yield decreases with time due to 'inbreeding depression', which is recognised by the farmers. So to keep up the yield performance, farmers need new improved seeds every three or four years and this, in reality, has not happened i.e. the Extension Authority has not provided them. On the other hand they are interested in introducing varieties without considering the impact on their yield, local people's behaviour and its consequences on rural livelihood. It appears that breeders are mainly interested in testing the performance of their 'scientific achievements'. There is a large gap between laboratory and field reality.

In practice, it is difficult to obtain and keep all desired characters by hybridisation. This is because the most desired characters are sometimes associated with other non-desired characters such as seed dormancy, susceptibility to pests, and are not flood or drought resistance. Scientists should look more into the better management of traditional varieties instead of using farmers' plots as the testing grounds for new varieties. There were more than one hundred traditional varieties, which were locally well adapted, but are ignored by the scientists. Local *aus* and *aman* varieties are photo-periodic sensitive. They tolerate floodwater, drought and other natural hazards, such as pest attacks etc.

The Department of Agriculture certified several new 'Hybrid' varieties of rice in 1998[5]. Among these, Aloke-6201 and Loknath-503 were well advertised and so reached the farmers. Many organisations, like the Agricultural Extension Department, NGOs[6], certified dealers, have been pushing, and in some cases, forcing farmers to buy these crop varieties. In Ujankhalsi, four farmers cultivated Aloke-6201 in the 1999 *boro* season. The yield was far less than expected i.e. as advertised. In the advertisement it was claimed that it would give 25 per cent more yield than newly

[5] In 1989 IRRI gave samples of some rice seeds to BRRI to continue research into the suitability of this variety in country's ecological context. However, 1993, the government imposed restrictions on research into this, instead they imported 270 kg hybrid seeds from India in 1995 (Akter, 1998). HRI (Hybrid Rice International), a sister company of Proagro Seed Company, India, discovered Hybrid-6201 which has been imported into Bangladesh by the ACI company in 1998 and renamed it 'Aloke -6201'. In 1998, the Government of Bangladesh gave permission of four companies to import and market hybrid rice seeds with the condition that they would have to produce sufficient seeds within three years and if any one failed to do this, permission would be cancelled. The companies were ACI, Macdonald, Mollika and Ganges Bangladesh LTD. Co. Seed Store and they imported 2200 kg seeds in 1998.
The BADC (Bangladesh Agriculture Development Corporation) and its related organisations, who have great expertise and resources, can produce only 5 % HYV seeds of rice and the remaining 95% was produced by farmers on their own. In this context, it is impossible to produce the required seeds by those Bangladeshi companies within three years. It is just a policy of Multinational Companies to make farmers more dependent on them for seeds and other technical facilities as well.

[6] For example, ACI has made a contract with BRAC, the largest NGO in Bangladesh, for marketing these seeds in rural areas. The workers of BRAC influenced farmers to buy this seed and sometimes forced their clients to buy them otherwise they would not provide any loans to them (Akter, 1998).

improved HYVs. In reality, farmers had much chaff without grain and lower yields than BR 14, or BR 29.

The impact of this 'Hybrid technology' on the farming decisions taken by smallholders should be a cause for great concern. With their technology, farmers cannot produce their own seeds. The hybrid needs inputs such as pesticides, herbicides and chemical fertilisers, thus making farmers more and more dependent on multi-national companies. Moreover, these plants need technical expertise, intensive care and are very sensitive to natural disturbances. So the suitability of this technology in a risk prone area like the floodplain is doubtful. Here most of the farmers are smallholders and there are few commercial farms. Many of them cannot obtain all the required inputs such as fertilisers, pesticides, irrigation water, etc. to manage this crop.

In Ujanlhalsi, farmers use two terms for seeds, *bichon* and *beez*. In the Bengali cosmos, *beez* means source / origin of main element or pure phenotype. *Beez mantra* is a mystical utterance, which forms the essential part of the mantra said to any deity. *Bees* means the pure and an essential part of life. Farmers without *beez* are considered to be as a man without *kolija* (livers). *Bichon* means their own harvested seeds and here *bees* means seeds from market or outsids.

They are less confident and suspicious about the seeds from markets or from unknown persons or areas. For example, in 1998, many farmers failed to harvest their *bichon* of onion due to bad weather and they were dependent on *beez* from elsewhere. As this area is well known for onion cultivation, many seed sellers came to the farmers to sell their seeds. Farmers did not readily buy seeds from them, so before buying these *beez*, they tested the germination rate of the seeds (Figure 7.9). They took seeds from those

sellers who assured their quality by taking their money after the harvest of the crop. This was a guarantee for their seeds.

(a)

(b)

Figure 7.9 Farmer is setting an experiment to test the germination rate of onion seeds (a) Onion seeds are put inside the arum stake for testing the rate of germination; and (b) Farmer is closing the arum stake after keeping seeds within it (he will leave this stake for 4/5 days to examine the rate of germination).

The above discussion explored the importance of seeds quality in rural agriculture. In case of new Hybrid rice seeds, farmers were suspicious and only four farmers grew this variety. Out of these four, two knew that it was not possible to preserve seeds for next season from this crop. They heard from the media (radio, posters / banners, etc.)

that this was a 'miracle' seed with large production. However, none knew the proper techniques for management, relying on leaflets and on the packets. They paid 200 TK. per kg for the seeds; whereas they could buy about 20 kg seeds of normal HYV rice for this money.

Therefore, certain questions need to be answered: is it possible for smallholding farmers to afford this along with its associate costs? Is it sensible to break hundreds years' tradition by making farmers seedless and to make them more dependent on the market or on multinational companies? Moreover, as it is such a risk prone area, is it wise and also viable to make farmers more vulnerable by narrowing down their crop choices?

7.4 ENVIRONMENTAL STRESSES AND FARMING DECISIONS:

Every farm family follows its own livelihood strategy (Heyer, 1989; Pretty, 1998) and design its livelihood activities accordingly. Sometimes shocks and stresses strike them and they have to change their normal plans to cope with the new situation. The strategies adapted depend on the assets they have, which also vary from person to person. In the previous chapter, it was discussed how farm families cope with crisis by using their assets. The aim of this section is to explore how they make or change their cropping decisions when problems occur.

Several environmental disasters appeared during the fieldwork period. In the 1997 *boro* season, there was a devastating hailstorm, which substantially damaged crops, mainly rice and onion. The subsequent *aus* season featured an early flood, which again damaged the rice crop. In the 1998 *aus* and *aman* seasons, there was a prolonged and

highly devastating flood, which damaged the crops of both seasons. So within my stay period, farmers faced a number of disasters, one after another. In fact these are the common events on the Bangladeshi floodplain ecology, which are often faced by farmers.

In terms of cropping decisions, when farmers face crop loss or partial damage, they have to readjust their next cropping seasons to minimise their losses and can improve their economic situation. The choices of suitable crops, depends on prevailing ecological conditions, farmers' economic capability, psychology, expertise, etc (Gladwin, 1980; Gladwin and Murtaugh, 1980; Cancian, 1980; Ortiz, 1980). In some cases there might be a common choice of crops, in others not. This varies with the particular requirements of the farm families. The following two examples illustrate the situation (Boxes 7.2 and 7.3).

These two cases show the variation in cropping decisions from two different perspectives. Nazrul placed emphasis on grain crops like wheat and mustard for immediate solution and also paddy for the next phase. On the other hand, Rahman was looking for more cash crops. The food grains, which he grew, were sufficient for his family's needs, so he did not place any emphasis on these. His main intention was to recover his losses. Nazrul had limited land and his all lands were not suitable for growing the cash crops which Rahman did. Moreover, he could not manage the high inputs needing cash crops such as banana, papaya, *potol* or brinjal. So he chose less input demanding grain crops.

Box 7.2

Nazrul is a poor farmer. His livelihood is diverse. He earns part by sharecropping land, part as a day labourer and the rest from his spare time basket making. He has only 16 decimals of land of his own in three plots on which his homestead and family graveyard are located. There is no cultivable land. The he cultivates as a sharecropper and varies from year to year. In 1997, he had 65 decimals in seven plots (two were *aus bhuin*, three *digha bhuin* and two *beeler bhuin).* He double crops the *aus* and *digha bhuin* and single cropped the *beeler bhuin.* In 1998 he sharecropped another 9 decomal of *aus bhuin* from a friend and in 1999, he sharecropped another 9 decimal plot of *aus bhuin* from a neighbour.

In the 1997 *boro* season, he cultivated HYV paddy on six plots and onion on one. Hailstorm destroyed the paddy on four of the plots. He harvested one of the other plots before the storm; the other was less affected because the rice has strong panicles. Most of his onion bulbs were also affected. The next season *(aus)* he cultivated jute on one plot and paddy on four plots, whereas he had planned to cultivate jute on two plots and paddy on three. He increased his paddy cultivation to cover his losses of the previous season. However, those plots went under floodwater in their early stage due to the early flood. He readjusted his plan again for the *Chaitally* and *boro* seasons. He grew mustard on four plots followed by paddy and onion, respectively. He had not planned to grow mustard because it might decrease soil fertility for paddy and onion. On one plot, he cultivated wheat instead of paddy, as wheat can be harvested much earlier than paddy. His plans for two plots remained unchanged and he grew paddy on them as usual. He harvested all of these crops safely. The next *aus* season (1998) he grew paddy on five plots and jute on one to cover last year's losses. However, all his paddy went under floodwater and he had to harvest his jute at an early stage. As a result, the quality and quantity of the fibre was reduced significantly. The next season he grew mustard on three plots followed by paddy, lentils on one plot followed by onion, wheat on one plot, onion on another and on two plots as he had decided earlier to minimise the losses (Appendix 2).

Box 7.3

Rahman, a rich farmer, has about 10.5 acres of land in 30 plots. Out of these 30 plots, one is for his homestead, one is for the family graveyard and two he gives over to sharecropping. The remaining 26 plots are under his cultivation. He was also affected like Nazrul by the same environmental problems. In the1997 *boro* season he had paddy in 12 plots and six were damaged. He had summer onion (*secha piaj*) on 4 plots and all were partially damaged; he also had one under *kodom* (seed onion) for seeds and this was damaged too. The next cropping season followed quickly and he made no changes to his. He planted paddy on 5 plots and 2 were damaged. He cultivated jute on 4 plots and had to harvest all early which reduced the quality and quantity of the fibre. In order to recover from these losses, he readjusted his crop plans for the next *chaitally* and *boro* seasons. He cultivated *potol*, a cucurbit vegetable crop, on three plots, whereas it was on only one plot in the previous year. Banana on three plots whereas he cultivated it on only one in the previous year. And papaya on one plot whereas he had cultivated none in the previous year. All these were on flood free land. He made some changes, also, on his low elevation plots. He grew potato and bitter gourd here instead of *kodom* (seed onion). This was to cover his vegetable requirements, to earn cash and to avoid the risk of *kodom*[1] cultivation. One more plot *laila piaj* (two in the previous year), one more *secha piaj* (four in the previous year) and reduced paddy cultivation on one plots (it was in 12 plots previously whereas this year it was in 11 plots) but he provided financial help to his sharecroppers to manage his crops.

In the *aus* season of 1998, he planted paddy on 4 plots, and 3 of those plots went under floodwater. He cultivated Jute was on 6 plots, and 5 of those went under floodwater, and papaya on one *vita bhuin* ,which was damaged as water encroached. To cover these losses, he rethought his plans. He reduced his *potol* crop to one plot and grew brinjal (aubergine) instead, which he thought was safer and would earn more cash. He reduced his *laila piaj* (winter onion) to one plot from three plots and cultivated chilli instead thinking that he could get a steady income from chilli. On his low elevated plots, he cultivated wheat on two (one was in the previous year) and paddy on 12 plots (i.e. an increased of one from the previous year) and onion on 5 plots (as same in the previous year) (Appendix 2).

There is a lack of data about the frequency of major floods at local level but it is available at national level. Table 7.3 shows the year of major floods in Bangladesh and its magnitude.

Table 7.3 Year of major floods in Bangladesh and its magnitude since 1952.

Year	**Flood affected areas** (sq. km)	**Coverage of area** (% of total area)
1954	36, 800	25.6
1955	50,500	35.2
1956	35,500	24.7
1962	37,300	26.0
1966	33,400	24.3
1968	37,300	26.0
1970	42,500	29.6
1974	52,500	36.6
1980	33,000	22.9
1987	57,300	39.9
1988	81,800	67.0
1998*	N/A	N/A

Note: When flooding area covered more than 20 per cent of the total area, it is treated as major flood.
Source: Khondker, 1991 (cited in Husain, 1993)
* The data of 1998 was not published yet. However, it was agreed by all that this is the most severe flood in recent times

When any flooding occurs farmers have to rearrange their crop planning which largely depends on their socio-economic capacity. Sen (2000) in his Social Choice and Capabilities thesis shows how a person's capability allows him to choose his well-being objectives. For example, a starving man and a fasting one apparently have similar levels of food consumption; but the two men have completely different capabilities: one can eat if he chooses, while the other cannot. Similarly, Rahman's had more freedom than Nazrul to choose from a wide range of crops and, as a result, their decisions making processes were different.

The above two cases concern different categories of farmers, so their decision making process might be expected to be different. Nevertheless, as stated earlier decision-making also varies within same group of farmers. Nazrul has a diverse livelihood. He manages his subsistence by selling his own and his son's labour and selling his baskets. He uses this money to finance his crop production. It extends his opportunities beyond those of some one who is solely dependent on agriculture. Though belonging to the same social category, such a person would be more vulnerable than Nazrul and would have very limited freedom to make better choices. Moreover, two persons with the same economic endowment may not respond the same, because their mental perception and physical reality (assets) would be different.

So it can be seen that different farmers respond differently when they face crises due to unforeseen or unexpected changes to their normal cultivation plan. They have to change their livelihood patterns to cope with the situation. They make cropping decisions in different ways according to their resources. The decision making process is not general, it varies between farmers in different social groups as well as different farmers within the same group.

8. HUMAN RESOURCES, SOCIAL ORGANISATIONS AND FARMERS

8.1 INTRODUCTION

Human resources and their social organisations are the most important factors in agricultural resources management. In previous chapters of this thesis several aspects of physical and environmental factors have been discussed which affect the agriculture decision-making process of farmers. This chapter will discuss various aspects of human resources and several social organisations which are interrelated in agricultural decision-making process of the farmers.

Farm families are the units of production and consumption, and form economic and social relationships. These are also the basic units for making agricultural decisions. They differ in the amount of available manpower and endowments. The poorer families have sufficient labour in respect to their land but have insufficient land and capital. On the other hand, wealthier farmers have sufficient land capital but have insufficient labourers and so are not able to put as much effort into working their land as the poorer families do. This dualism between labour and land-capital exists in the rural areas and is important in managing agriculture resources. Therefore, farmers have to adopt several strategies when making agricultural decisions.

Poorer families have a shortage of resources to sustain themselves the year round, especially in the crisis period, therefore, they often have to borrow money from a

variety of sources. To pay it back, they have to sell their produce during the early harvest when, unfortunately, the price of the produce often goes down. Although the government has a policy for maintaining a standard market price, it is not very effective due to its limitations. There are also some ways of helping farmers to cope with these situations. This is by the formal banks, supplying credits to the needy farmers. However, often it fails to reach the people in the greatest need. Although the credit programmes of the non-governmental organisations have reached the rural areas and are now easier to access by the poorer families, they have very limited options for agricultural credit. Moreover, due to authorities lack of understanding of the actual socio-cultural complexities of rural areas, some new problems have arisen. This chapter concludes in arguing that farm families are not an isolated or independent body in rural areas, as they are related to several stakeholders who are interdependent and are part and parcel of the rural agrarian structure. This relationship influences directly and indirectly farmers in making their agricultural decisions. It demands a holistic approach to understand this relationship, which, so far, appears lacking in most of the intervention-works in rural areas.

8.2 LABOURS AND FARMERS

Labour is central to production in Bangladeshi agriculture as elsewhere in the Third World where there is a low-level of mechanisation. Plots have sometimes to be ploughed 5 to 7 times before they are ready for the farmers to broadcast seeds or plant seedlings. The plots, also, require weeding two or three times before harvest. Harvesting itself is labour intensive. The majority of adult members of a farming family is involved in some way in the farming activities. When farmers are going to set up their crop plans they have to consider the availability of labour. In households with insufficient manpower, wage labourers must be sought for the farming activities.

Landless people live largely by selling their labour. During peak periods of agricultural work, such as transplanting or harvesting of major crops, there is a scarcity of labour in the village. When the land is under water, agricultural labourers have to seek alternative sources of income, such as, fishing, van pulling, starting small business, etc. or to seek work outside the area. Farmers from different social groups, and individuals from same group, respond differently to this fluctuation in the labour market for managing agricultural resources. This availability of labour at different times of the year plays a crucial role on farmers' cropping decisions. This section discusses how farmers make their cropping decisions according to the availability of labourers.

8.2.1 The Situation of Study Village:

To cultivate crops, labour is a crucial factor. Each crop requires a certain amount of labour and farmers are concerned about this. There is a positive correlation between

farm output and the use of labourers on the farm (Jabbar and Faruque, 1978; Jabbar, 1991; Alauddin *et al.*, 1994; Alauddin and Tisdell, 1995). The HYV technologies are highly labour intensive and so they expand employment opportunities in the rural areas of Bangladesh (Clay and Khan, 1977). Here a number of crops require more than 100 man-days per acre e.g. HYV paddy, onion, chilli, etc. This is required for land levelling, land development, irrigation and drainage, weeding, other crop care and management. Farm families do not consider their family members as labourers. This is because they work for their subsistence. By 'labour' they mean hired labourers from outside their households. Practically, all agricultural holdings have at some time had a labour demand that exceeds the capacity of the family members. The demand for additional manpower is met from the local labour market. The number of wage labourers in Ujankhalsi village is shown in the Table 8.1.

Table 8.1 Availability of wage labour (during 1998-99) with their socio-economic groups in Ujankhalsi

Labourer (male)	Rich families	Medium families	Small farm families	Poor families	**Total**
Regular labour	-	-	1	62	**63**
Seasonal labour	-	2	16	28	**46**
Contracted day labour	-	-	-	6	**6**
Male servant (monthly, seasonally, or yearly)	-	-	-	11	**11**
Total	-	**2**	**17**	**107**	**126**

There are two medium farmers who, very occasionally used to sell labour. Both are from extended families. They have surplus of labourers in their families and this provides extra income during lean periods. There is one regular wage labourer from a 'small farm family'. He is also from an extended family of 8 members. Although he

has 1 acre of land, it is insufficient to support his family. To do this, he has to sell his labour. Those who are seasonal labourers in this group, seek opportunities to work during the lean period (when the land is under water). They do not have a retained surplus of produce to maintain their families during this time. The poorest farmers are almost landless. Some of them have few decimals of land and rent some land for sharecropping and try to manage with this. To survive, they have to enter into the labour market. Some diversify their occupations by becoming a part-time fisherman, or try to start a small seasonal business or to be a van puller. Some even migrate to other places in order to seek work but none of them stay there permanently. During the cropping season, all are engaging in cropping either as labourers or as sharecroppers.

So by selling labour or engaging in other activities during the off season, medium and small farmers can save some money by which they can manage their crops. For setting up their own crop plan, they, of course, consider their present situation and other resources.

There is a clear division of labour by gender. Women rarely participate in agricultural work in fields due to the *purdah*[1] norm. *Purdah* for women means that they are restricted to working in the homestead area. They are not supposed to work in the crop field or in the market area. Several researchers found that women's work outside the homestead areas is restricted in different areas in Bangladesh (Abdullah and Zeidenstein, 1982; Jansen, 1987; Dutta, 1998). However, White (1992) and Nath (1986) found in Rajshahi District of Bangladesh that though Bengali women do not

[1] *Purdah*- a term used for Muslim women relating to restriction, not to move outside without a veil.

work in the crop fields but *Santal*[2] women do. Wallace *et al* (1987) found that during *boro* cropping season, women from landless and small farm families work in the fields during daytime. However, in my study village, women's main tasks remain within the homestead area, though some poorer women do work outside. Female tasks centre on post-harvest processing work carried out within the homestead compound. In addition, they have many domestic responsibilities; cooking, taking care of children, poultry and livestock rearing, managing homestead gardens, etc. If a woman is a head of a household, she must also organise agricultural activities from her homestead.

It is difficult to find out the actual number of women who are working as labourers. In Ujankhalsi I found seven female who are working as 'day labourers' either in the crop fields or on the road i.e. outside the homestead area (Figure 8.1). There are 31 (as far I recorded) women who were doing paid work within the homestead area. Out of these 31, there are 23 are seasonal, i.e. only work during the post harvest seasons. Normally, these women sell their labour. With very few exceptions, they might do some work for kind. Sometimes they help their husbands in the fields (Figure 8.2). In addition to these 31, 23 women who work without cash, just for some goods or only for meals. Sometimes they work for rich or medium farmers to keep up a good relationship with them. Normally, their husband or son sharecrop their land or want to get land in the cropping season or credit in distress periods. There are 43 women who assist their husbands or sons and work with them in the crop fields. They are not wage labourers but are saving money by giving labour. Otherwise they would have to hire labour. The majority are from poor families. Only 4 women come from lower medium farmers.

[2] A tribal community lives in the northern region (particularly in Rajsjahi region) of Bangladesh. Here White (1992) separates *santal* families from Bengali families without any explanation. I think they are also a part of Bengali culture.

Figure 8.1 A woman is working in the crop-field as a day labourer

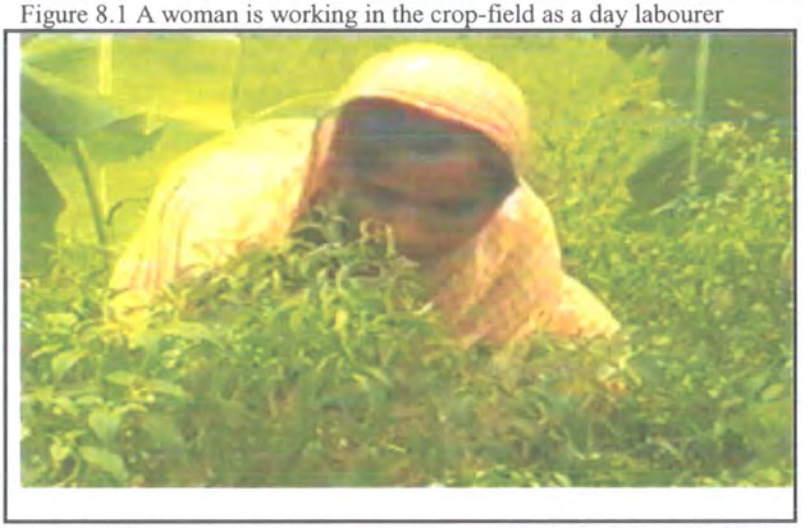

Figure 8.2a A woman is helping her husband is their crop-field (chilli garden) field.

Figure 8.2b A farmer is taking his breakfast, which is brought by his wife in the field

So women can play an important role by performing all post harvest activities in the homestead area as well as assisting male members in the field. Sometimes, they help their husbands or sons to get more land for sharecropping from the landlords. Moreover, their earnings also contribute substantially to maintaining their livelihood. When making any farming decisions, men also take this into consideration.

Children are, also, directly involved in agricultural activities, such as weeding of agricultural land, transplanting seedlings, taking care of cattle, carrying food to the field, etc. In a study Cain (1980) found that Bangladeshi children begin being economically useful around the age of 6. At this age they can gather fuel, fetch water, take care of younger children, carry messages, etc. Between the age of 10 and 13, boys become net producers by doing ploughing, transplanting or other agricultural works. Nag *et al.* (1978) also found similar results in the case of Nepalese and Javanese children. Netting (1993) found that Kofyar children become active in agricultural activities from childhood. To farm families work of children is important. Light, but time-consuming, work frees adults for activities with a higher output. The role that children will play must, therefore, be taken into consideration when making any farming decision.

8.2.2 When Do Farm Families Need Labourers?

The intensity of agricultural activities in floodplain is seasonal. *Boro* and *aus* seasons are busier than the *aman* season. During these two seasons farmers become very busy in working in the fields. At this time they grow their important, labour intensive, crops such as paddy, onion, chilli, jute, different vegetables, etc. The owners work harder for longer period at that time. In some cases, the boys remain away from school to work in

the fields. This minimises the labour costs. Although some of their crop plans for their plots can be met by their family labourers, they often need some extra help during these times. The critical time for having sufficient labourers is during the period of transplantation and harvesting of the crops. Weeding, drainage and irrigation and other care management, also require an adequate number of labours (Jansen, 1987 and Jabbar, 1991).

In general, rich farmers have plenty of land which is difficult to manage solely by their family labourers. Moreover, due to their social status, it is socially divisive to work in the fields. So, in most cases, they have to rely on labourers from outside. Medium farmers may also find it difficult to manage their land by themselves, particularly during the peak season. Then they have to hire labourers from outside in order to manage their crops. Those farmers who have other occupations, along with farming, have less time to look after their farms, so they have to make their crop plans in such a way that the work can be managed by a minimum of hired wage labour (Feder, 1985; Binswanger and Rosenzweig, 1986; Binswanger and Elgin, 1990; Benjamin, 1992). Poor and small farmers have less land than rich and medium farmers and they do not have enough money to hire labour. Mostly, they have to rely on their family for labour (Sen, 1966; 1975). In Ujankhalsi village I found different strategies adopted by farmers to address the problem.

8.2.3 Family Composition

Family composition and its working process is an important aspect in the decision making process of farm families. The members within the same household live as a work force unit. They work together to address their common goals. There is a

tendency among the poorer farm families to live in nuclear families, in response to their low income levels, as we have seen in case of Jamal Kamal (Chapter 4, section 4.5.8). They do not want to share their income with more persons than absolutely necessary. They, also, prepare their crop plan in such a way that they hope to manage by themselves. This is the opposite case to the rich farmers one-third of whom, live in extended families (Table 8.2). At the present time Ismail is such a farmer in Ujankhalsi. He has 10 members in his household. Except for the youngest, all the brothers are married with children. This pattern is repeated in some of the other wealthy families. Amir, one of the rich men in the village, has 23 members in his household. One of his sons, Sultan, lives separately (as mentioned above). Similarly, Rahim, another wealthy man, lives with his two brothers in a homestead, which has 16 members.

Table 2 Family size of the villagers in different categories

Family type	Rich farmers	Medium farmers	Small farmers	Poor families	Total
Nuclear family	6	70	112	226	414
Extended family	18	15	7	4	44
Average family size	**9.75**	**4.66**	**4.39**	**3.88**	**4.46**

In Bangladesh rural areas, Abdullah and Zeidenstein (1982) find that those who have more than average resources have a tendency to remain in joint families. Normally, it lasts as long as the father, the head of the family, is alive. After the death of father, they may stay together or form separate kitchens. Ellickson (1972) and Bertocii (1972) also find 17 per cent and 30 per cent, respectively, of rich families stay together in two villages in Comilla, Bangladesh. Jansen (1987) describes that those who are more exposed to poverty have a tendency to form nuclear families. In his studied village, he

found landless extended families get separated more rapidly into nuclear families than well-to-do families.

My finding suggests that in Ujankhalsi village, the situation is similar to that described by Ellickson (1972) and Bertocii (1972) i.e. richer families have a greater tendency to stay together than do poorer families. I discussed this with several farmers who gave various reasons why families separate or unite. The wealthier unite because:

- They do not wish to divide their property and as this would affect their livelihood and status;
- They ensure a supply of labour and inputs by combining their family contributions;
- They maintain their influence as a wealthy farming family, whereas separately they would each have a small parcel of land;
- They can work together, make decision jointly and may be better equipped to survive adverse conditions making them less vulnerable to hazard or risk.

The poorer people do not form extended families because:

- Little or no land; so do not need any surplus labour to maintain crops.
- Food shortage, nuclear family tends to concentrate only feeding itself rather than sharing;
- The hardship is acute during the lean period and the main earning member does not want to starve with his wife and children at that time.

So they adjust their households' endowments to their capabilities. To do this, they adjust labour intensity per unit area rather than modifying farm size to available labourers, through sharecropping arrangement, mortgaging or selling land market (Heltberg, 1998; Sadoulet *et al.*, 1998)). This certainly influences cropping decisions as

different crops require different amounts of labour and during the period of adjustment farmers have to take into consideration these factors.

8.2.4 Patronage Influence

Wealthier farmers often expand their patronage influence to get easy access to sufficient labour from their clients. To do this, they favour their clients by giving them land for sharecropping, credit during the lean period, providing work during slack periods, etc. The main purpose of this help is to ensure getting labour when necessary. In this case, the employers are in a good position to impose their own terms and conditions (Basu, 1997; Heltberg, 1998). By doing this they also create an imperfection in the labour market, for when an employee is in debt and he is obligated to work for the landlord. Even during peak seasons this employee is obliged to work for his patron instead of doing his own important work.

The wealthier farmers are obtaining this 'opportunity cost' due to the seasonality (Bellas, 1984). So by using their influence, wealthier farmers can make cropping decisions in such a way that they are able to manage their crops. However, during the period of fieldwork, I came to understand that wealthier farmers believe that hired labourers are not the perfect substitute of family labourers. It is held here that when farmers think that the land, the crop and the profit from it is their own, they get a different feeling, *dorod* (affection), for working there. They put their best efforts into producing crops and so get better returns.

This can be explained by a decline in productivity (due to the input output ratio - here input is maximum for a constant production) but increase profitability (if the cost of

family labourers is deduced from the total input cost - as poorer families do). In that point poor farmers are more profitable than wealthier farmers (Rosenzweig and Binswanger, 1993). There are a number of studies on this relationship in South Asia. For examples, Berry and Cline (1979) for Brazil, Colombia, Philippines, Pakistan, India and Malayasia; Rao and Chotigeat (1981) for South India; Carter (1984) for Haryana in North India; Bhalla (1979) and Bharadwaj (1974) for India; Boyce (1987) for Bangladesh. They all find this inverse relationship between farm size and output per unit area.

8.2.5 Seeking Helps from Relatives and Friends

It is rarely possible for a poorer farm family to expand his patronage. They have little resources that could help them to do this. They, most often, act as clients of wealthier farmers. However, when they need any help, either they have to hire labours or have to seek help from their friends and relatives. They also help their relatives when it is necessary for them. This is a mutual understanding among their relatives and friends. During peak seasons, I found in Ujankhalsi that farmers inform their relatives when to come to help in their transplantation or harvesting work and they did come to help.

There is another popular labour exchange behaviour among the poorer families in Ujankhalsi, which is known as *begar*. In this system farmers invite their relatives and friends to work for them by means of kind not by cash. The owners provide food for those invited, normally, for two meals, lunch and dinner. Farmers use this *begar* system when there is a large amount of work to do within a short period, such as having to harvest quickly due to an early flood, or to harvest damaged crops due to hail storm or by heavy rain, or to finish their last harvest for that season.

8.2.6 Changing Cropping Decisions

As it has been discussed earlier, most of the HYV crops are labour intensive and in some cases are not profitable if farmers take into account the cost of their own labour. Smallholding farm families, unlike rich farmers, do not consider their labour as an economic calculation. In the previous chapter it is discussed that rich farmers are less interested in cultivating paddy on their excess lands, as this HYV paddy has become less profitable to them. Moreover, to get sufficient labour at appropriate times is becoming difficult for them. So some of them have already switched their crop choice from paddy to banana, papaya or other less labour intensive cash crops. Some of them also decide to mortgage their land so as to have cash to start another income generating enterprise.

As the floodplain is a risk prone area, there are several natural calamities which cause damage to farmers' crops. At such times farmers need ready labour to save their crops from those disasters. Sometimes it is difficult to get sufficient labours and so their crops get damaged. This also influences their cropping decisions. For example, in 1997 and 1998, some farmers failed to harvest their *aus* paddy and jute from floods due to labour shortage. Next year they were very careful in the choice they made to crops on their vulnerable plots.

From the above account, it is revealed that for managing crops, the importance of sufficient labourer is immense. Its necessity varies from person to person and also different social groups address this issue differently. Most farm families try to adjust their output input ratio. However, peasant families do not account for their family labourers as household relations are so interwoven with residence. This serves as an

anchor for household members, so they work for managing their resources as a mean of their subsistence. It is an implicit contract within the household and departs from the formal explicit contract of business. This behavioural and material relationship is important in understanding agricultural resource management. The internal arrangement of the floodplain farming community in considering this issue (labour) is intertwined with whole the social system and is complex in nature and has to be taken into consideration when attempting to understand the farmers' decision-making process.

8.3 MARKETING OF FARM PRODUCE

Small farmers dominate Bangladeshi agriculture and most rural people depend on agriculture for their livelihood. The existing, very limited, land is cropped once, twice or thrice and farmers try to grow as many crops as possible to maximise their returns. Farming in Bangladesh is gradually becoming dependent on application of modern inputs such as HYV seeds, chemical fertilisers, pesticides, irrigation water, etc. with increased sales of produce by the farmers as the result of increased production (Majiruddin, 1991). Normally, market and marketing policies play a crucial role in modernisation. The structure of the rural market is more or less the same throughout the country, where many intermediaries exist between the producers and consumers and, traditionally, farmers actively participate in this system. Recent infrastructure and electronic development links this rural market to the wider context both nationally and internationally and has significance in farmers' crop planning. The main purpose of this section is to highlight the influence of the rural marketing system in agricultural decision making process by the farmers.

8.3.1 Marketing System:

8.3.1.1 Local Markets

In Bengali, the rural market has three connotations: *bazar*, *hat* and *bondor*. *Bazar* is held everyday in the week either in morning or in afternoon. This term also designates the rural village level small primary market, where rural people sell their crops and procure their daily necessities. The structure is temporary or semi-permanent. This

market is operated mainly by the farmers (*krishak / chashi*), local traders (*beparies*[3] or *farias*[4]) and small retailers (*dokander*[5] / *khucra baybosai*). Usually it is held on the river bank, or in any place of local significance, e.g. under a big tree, confluence of several roads, near union council or school, playground, etc. *Hat* is bigger than *bazar* and is where a large number of growers, traders (*baybosai*) come from different places. Generally, it is held twice a week and has permanent or semi permanent structures. Here, commission agents (*aratder*), wholesalers (*baybosai or mohazon*), banking and other communication facilities are available. It also develops by the side of a big river, locally or nationally important place where transport facilities are available and where it is comparatively easier to gain access to district towns or national highways or any port. In the *hat,* along with selling opportunities of agricultural produce, people can buy agricultural inputs, machinery and other daily necessities. Husking mills, oil mills or other small agro-based industries have also developed near to the *hat*. The term *Bondor* means a port. It is actually a trading town situated near any port and its infrastructures and gatherings are similar to the *hat*.

Another type of market is operated in rural production regions. This is a secondary market (*arat*), which serves as a wholesale outlet that operates as an assembly centre for products from the region and as a distribution point to the consumer areas. Here mostly *aratders*,

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[3] *Beparies* are itinerant traders, who buy produce from the local growers and sell it to the wholesalers directly or through commission agents.

[4] *Farias* are not traders in true sense, actually they are the agents of wholesalers or commission agents who exploit growers to sell their produces to their respective *mohazon* and they take contract money from their *mohazon* for their services.

[5] *Dokander* is a shopkeeper who retails goods to the local people. They may buy some local produces such as vegetables for retail selling to the local people. Sometimes they also process the fresh produce in order to sell in the local market, such as buy wheat from the *krishak* and make flour from wheat grain then sell them
to local people. Locally they are also know an *khuchra baybisai or mudi* (grocer).

bayboshai / mohazon (wholesale traders) and *beparies*, processors take part. In only a very few cases do growers take part in this market. No retail sale operates here. The *arat* develops on major rivers, near national high ways or railroad channels, which allow readily access to the national transport system.

In my study area, there are several *bazaars,* such as the Ujankhalsi *bazar*; Alipur *bazar*, etc.; three *hats*, such as, Taherpur *hat* (5 km), Durgapur *hat* (8 km) and Baneswar *hat* (18 Km) and two *arat* such as Puthia *arat* and Baneswar *arat* are operating which have great influence on local agricultural production.

8.3.1.2 How Farmers Participate in the Local *Bazar* or *Hat*

"Since man first traded salt for arrowheads, markets have been crucial in the process of development" (Wennergren *et al.*, 1984: 127). Ever since farmers produced an excess of specialised crops, they needed to exchange those with others. In other words, with the specialisation of production, it becomes inevitable for farmers to exchange their goods for their subsistence requirements. To do this, households participated in exchanging or buying and selling their goods in a common place, so ultimately, a *bazar* develops. So in rural areas, *bazar* or *hat* automatically develops by the spontaneous participation of local people. The government has not, initially or directly, developed it. When local people develop a market, the government might provide help by expanding its infrastructure and other facilities, when considering the future economic expansion of the locality. The importance of *bazar* or *hat,* and their expansions, also centred on the local production system. Not all *hat*s are suitable for selling or buying all agricultural produces. What people are growing in that area is important for expanding its operation. Each *hat* has its reputation for marketing some specific

products. For example, Taherpur *hat* is familiar to the producers and traders throughout the country for onion and banana marketing. Baneswar *hat* is prominent for banana, papaya and mango marketing. This is due to activities of local farmers towards those crops and their active participation for these markets. So farmers' agricultural activities are centred through local marketing opportunities and vice versa.

Generally, agricultural produce are marketed by the farmers from their homes or in local markets to the *beparies* who transport them to the *hat* or *arat* for selling to the *baybishai* (traders / wholesalers) through *aratder*s (commission agents). Farmers can sell their produce directly to *aratder* or *baybosai* if their amount is large enough. The crop may pass through a procession, like the milling of paddy or bailing of jute fibre (Hussain and Momen, 1974). These then move from *baybosai* to exporters or processors who either export them or make them suitable as end products for consumers. Several products have more or less similar channels to pass through to reach to the consumers. The following figure (Fig 8.3) illustrates the marketing system of paddy / rice in the study area.

It is often complained that there is long chain of functionaries operating between growers and consumers who take a major share from the price of consumers by depriving growers of taking this (Huque, 1939; Blair, 1978; Wennergren, 1984). To me, this traditional system has been evolved to meet the requirements of both parties. This is because the production is seasonal and widely dispersed. The quantities obtained are often small, so farmers have poor economic resources, an unsatisfactory transport system and limited, modern, storage facilities, which ultimately, require the services of such functionaries (Majiruddin, 1991). This chain of functionaries could be

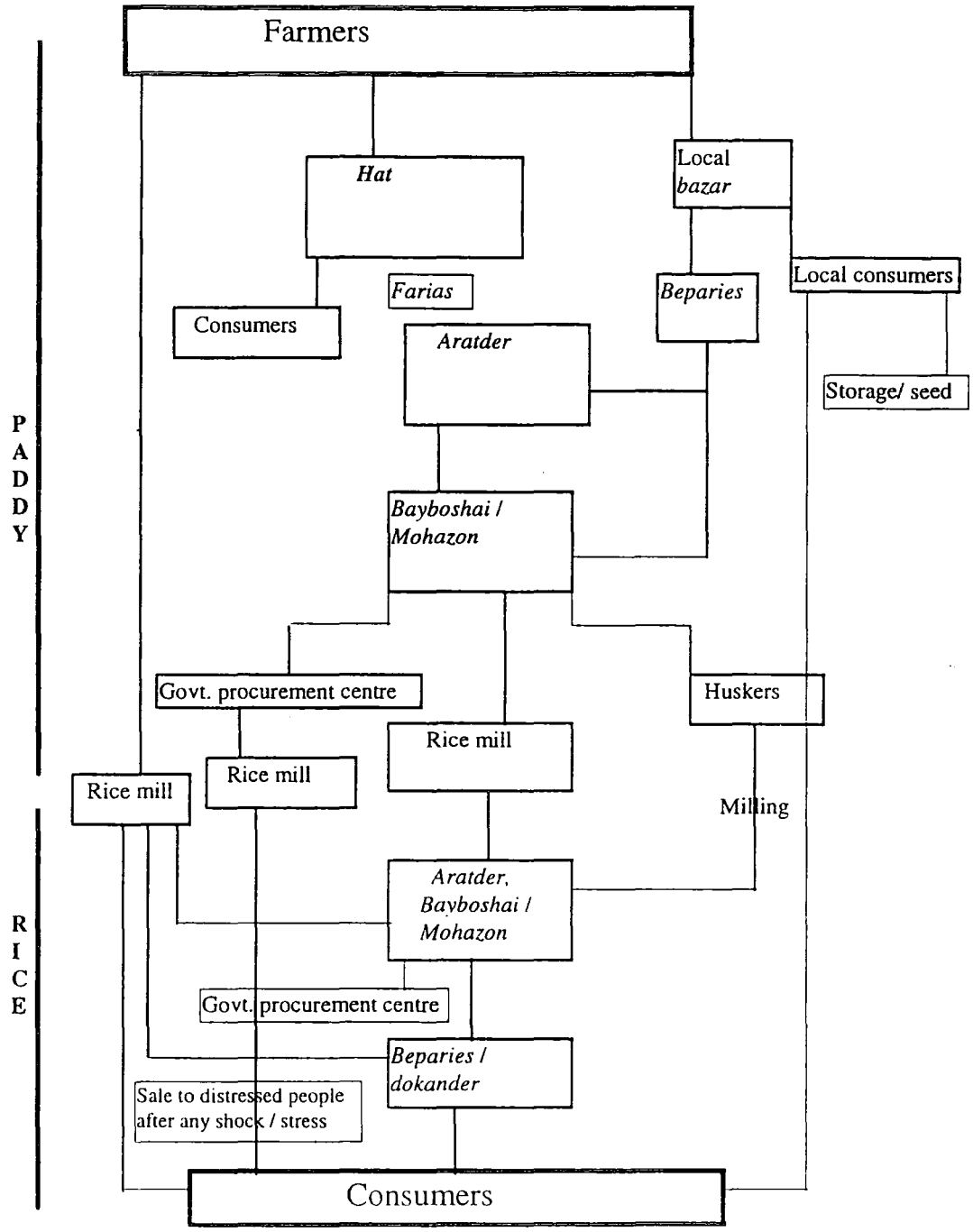

Fig. 8.3 Marketing channels of paddy / rice in Rajshahi area, Bangladesh.

reduced significantly by improving transport systems or implementing a modern marketing system, such as used in the western world. However, in the prevailing marketing system, the present rural infrastructure, in the true sense, helps growers to get moderate prices for their produce rather than slicing off a share from the consumer price.

8.3.1.3 The Farmers' Experience in the Markets

The local market is not only the place where farmers sell their produce and buy necessitates, it is also their place of recreation and networking with their fellow farmers from other places and with wider communities. It has now become a practice of farmers to go to the *hat* on the every *hat*-day, even if they have nothing to sell or to buy in there. This practice allows them to meet their friends, exchange views, learn the current trends in market prices of some of their important produce and agricultural inputs. The aforesaid chain of functionaries also helps their clients to pass on information regarding recent trends of several types of produce in the national and international markets. In the markets there are specific areas for selling or buying certain commodities where all related persons can gather and, informally, exchange their experiences. A market, thus, can be seen as a aggregation of different networks, each focusing on a specific aspect of the knowledge system (Haverkort, 1993). On the basis of the information received, they can make decisions what about what to do with their produce and inputs and what to grow next.

Maurya (1989) shows how a paddy variety, *Mashuri*, spread to different provinces of India through farmers' networking. McCorkle *et al.*, (1988), have shown by citing examples from Nigerian farmers and so as Schuthof (1990) in the case of Zimbabwean

farmers, that knowledge exchange takes places in more or less regular ways in some common places such as markets, grain mills, blacksmiths' workshops, prayer centres, etc. and this networking by farmers influences farmers in making farming decisions. Thus networking in the *bazar* or *hat* plays an important role in the agricultural decision making process of farmers.

8.3.1.4 The Pricing of Market Produce

The Bangladeshi agricultural marketing system is imperfect. There are no strict regulations to maintain a standard price for agricultural produce and its inputs. Those people who are related to thee functionaries, can manipulate the market easily by not buying the produce or by creating an artificial crisis for the produce or inputs in the market. The farmers have nothing to do with these manipulations. Moreover, in the floodplain, where agriculture is seasonal, there is an abundance of produce in the market during the principal harvesting period of a crop and so the price drops down to the minimum level. Whereas, in the 'off season', it goes up to the highest level (Table 8.3). In this fluctuation of market prices, small farmers are most affected. They lack sustaining power and have to sell a part of their produce at the lower price during early harvest and have to buy similar produce back at a higher price during off season.

Recently the Bangladesh government has placed emphasis on developing the infrastructure in rural areas, so as to link growers to the bigger market. Alongside this, the recent development of electronic media is helping traders / merchants to come closer to the growers, thus avoiding some functionaries, and so helping growers in getting better prices. For example, a new metal road has been constructed which connects the national highway from the capital to these villages and, consequently,

Table 8.3: Monthly price of some major crops in a rural market (Taherpur *hat*) from January 1997 to August 1999. The price represents the average value of 4 weeks in *Taka* for 40 kg except banana.

Name of the crops	Year/ month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1997	277	265	272	292	309	242	235	241	273	285	305	300
Paddy	1998	298	316	320	328	322	205	201	222	254	263	318	319
	1999	316	301	305	310	336	194	221					
	1997	415	392	311	255	270	315	302	320	351	355	375	382
Wheat	1998	411	413	314	272	278	301	315	355	380	401	392	379
	1999	478	470	345	264	280	297	298					
	1997	-	-	-	-	-	-	375	305	254	263	294	310
Jute	1998	-	-	-	-	-	440	425	349	307	274	268	300
	1999	-	-	-	-	-	396	400	418				
	1997	95	105	112	135	137	154	135	105	90	92	85	81
Banana	1998	100	110	122	135	151	160	127	100	98	80	87	92
	1999	117	120	115	128	131	140	107	92				
	1997	85	105	141	145	133	102	105	107	95	102	80	77
Papaya	1998	93	153	192	210	170	162	127	130	118	120	104	83
	1999	100	137	178	230	191	174	170	167				
	1997	181	160	95	102	118	145	155	210	233	250	238	215
Potato	1998	208	188	150	121	165	200	245	252	280	272	260	233
	1999	205	200	136	167	180	203	215	262				
	1997	-	-	-	205	267	314	355	323	345	380	412	428
Onion (bigger, for vege & spices)	1998	-	-	-	252	320	212	360	508	610	727	900	1400
	1999	-	-	-	375	234	275	400	775				
	1997	-	-	-	230	291	365	436	470	557	622	722	875
Onion (smaller, for seeds)	1998	-	-	-	390	467	725	827	850	1465	1660	2300	N.A.
	1999	-	-	-	375	477	815	854	1705				
	1997	265	302	315	322	332	305	311	352	387	475	410	303
Chilli	1998	235	240	262	284	196	300	290	321	425	450	443	375
	1999	301	280	305	380	415	438	462	725				

Source: Local market survey.

* In case of banana, the above price is for a good bunch (*kandhi*), which contains around 80 to 120 bananas.

Recently the Bangladesh government has placed emphasis on developing the infrastructure in rural areas, so as to link growers to the bigger market. Alongside this, the recent development of electronic media is helping traders / merchants to come closer to the growers, thus avoiding some functionaries, and so helping growers in getting better prices. For example, a new metal road has been constructed which connects the national highway from the capital to these villages and, consequently, enables the traders to get easier access to the source of the produce. In fact, traders

come to Ujankhalsi or the nearly villages to buy papaya and banana directly from the farmers. As a result, farmers are facing fewer problems in getting better prices and also become more interested in growing these crops (Table 8.4). Some of this produce is now exported abroad.

Some crops, which are not grown sufficiently to satisfy the people's demand, are now imported by the government from other countries. For example, onion, which is normally grown in Bangladesh, is not sufficient for the population's consumption the year round. Often, traders have to import onion from other countries. In 1997/98 and 1998/99, the price of onion was higher in those countries than it had been in previous years due to the low production. As a result, the price was also higher in Bangladesh. As onion is the most important cash crop in Ujankhalsi area, farmers got very good price in those years (Table 8.3).

Therefore, as was observed, they became more interested in growing more onion on their suitable land (Table8.4). This has, also, given a new dimension to the economy of this area. For example, at the start of my fieldwork, the local *bazar* had only five shops including two tea stalls. Within these two years, there were 20 shops including three tea stalls. Now all sorts of commodities including groceries, stationeries, garments, fertilisers and insecticides, diesel, petrol and other items are available there. The *bazar* changed to being a weekly *hat*, where people from other places come to shop on a specific day (Thursday) and villagers to sell their produce there. So local, national and international markets are coming closer to the farmers due to structural facilities being developed and better marketing facilities. Ultimately, these influence the farmers' decision-making process.

Table 8.4. Cultivated areas (in acres) of some major crops in Durgapur thana since 1994-95 to 1998-1999.

Crops	1994-95	1995-96	1996-97	1997-98	1998-99
Aus paddy	5125	5248	5294	4793	2554
Aman paddy	15050	16138	17989	17297	16346
Boro paddy	9622	10187	10675	11203	14529
Wheat	8999	10156	12871	13442	12898
Jute	514	963	852	1359	1062
Banana	370	518	593	840	852
Papaya	247	358	432	766	716
Potato	2550	2792	2730	3891	3558
Onion	N. A.	N. A.	N. A.	N. A.	N. A.
Chilli	N. A.	N. A.	N. A.	N. A.	N. A.

Source: Agriculture Office, Durgapur *thana*, Rajshahi, Bangladesh.

8.3.1.4 Government's Procurement System and Its Impact Locally

The government of Bangladesh has an agricultural produce procurement programme, particularly for crops produced in large quantities such as paddy / rice, wheat and jute (Ahmed, 1984; Farruk, 1970). Every year a fixed rate for a particular produce is announced and farmers can sell their produce at that price at the procurement centre. However, this is, sometimes, far away from the village. Every year there is an enhancement in the price, as production costs are increasing day by day. The government does this to ensure a stable market price for the produce at national level and also to help people in the distress period. However, as I observed, most often it failed to fulfil its goal due to several reasons:

- There is a long waiting period at the procurement centre. Some farmers are reluctant to wait for such a long period;
- The produce to be sold at the centre should maintain certain criteria, such as specific moisture content, quality of grains, amount of foreign grains, etc. which are difficult to maintain by some farmers;

- Harassment by the staff of the procurement centre who in some cases refuse to accept the grains, citing lacking of the above criteria in order to get bribe money. Farmers also reported that these staffs had an illegal understanding with the traders from whom they used to buy.
- In some cases the price of the centre goes below the price of the market and in these circumstances, farmers prefer to sell their produce in the market rather than at the centre.

Due to these problems, this programme fails to create a positive impact on the growers. As a result *baparies* and *baybosai* operate at the primary level and buy from the farmers and sell to the procurement centre. In practice, it is unrealistic to expect that the small farmers would take their small quantities, in some cases not highly processed produce, to the centre where they will have to wait for couple of hours and have to pay bribes to sell their produce. Rather it is advantageous for them to sell these to the *beparies* or *baybosai* who are getting the benefit of this policy. Moreover, the majority of the farmers think of selling their produce only when they need to buy something else and as a result, they may only go to the market to monitor the market price and can take further decisions.

On the other hand this procurement policy sometimes depresses the market price. This was observed in case of wheat price. There are some Food For Work Programme (FFWP) in Bangladesh operated by Government and Non-governmental Organisation (e.g. CARE). Under this scheme, wheat is given as a wage to the labourer. Normally this FFWP operates in the rural area during the dry season (January to June), the peak time for the wheat supply in the rural market. At this time when labourers get wheat as their wage, they used to sell some of it to the market and, ultimately, liquidate the market price. So the role of this procurement policy is not still effective in raising the

price of the produce at the grass roots level. If farmers can get access to the system on their doorstep without any harassment / delay, it could influence farming decisions.

8.3.1.5 Local Storage System and Its Impact on Farmers

In floodplain areas crops are grown seasonally, but consumed all year round and, as a result, produce must be stored to ensure a steady supply. In my study area, there are two types of storage systems, which have an impact on the farmers' decision-making process.

8.3.1.5.1 Storage system at the farmers' premises

In the floodplain, houses are erected on the flood-free land. In most of the cases, the floors remain earthen, the walls of the houses are made of mud (for medium and rich farm families) or with bamboo or jute mats (for poorer families). Roofs are normally made of corrugated iron sheet (tin) or with paddy straw for both the rich-medium and the poorer families. Food grains are stored either within the dwelling house or in a separate storehouse (*gola*) within the compound of the house. Food grains such as paddy and wheat are stored in *doles* (bamboo made containers) or in ghani bags on the *macha* (planking). Beside this, most of the houses have a wooden platform just below the thatch. Farmers use this platform to store their harvested onion, potatoes (local variety), garlic, mango, jackfruit and other similar produce. Under these traditional storage systems, farmers can store their produce for a long period. This system fits well with their traditional crops, as I mentioned in my previous chapter, citing an example of onion. However, they have limited scope for storing fresh vegetables and fruits for a long periods. For this they need a modern storage system.

8.3.1.5.2 Cold storage:

Recently there is a dramatic development of cold storage facilities in the country. The first cold storage was set up in 1959 and now there are over 193 cold storages throughout the country, with a capacity of 739,000 metric tons (Majiruddin, 1991; BBS, 1998). These are mainly for storage of potatoes so as to make them available all year round and, also, to have a ready supply of seed potatoes.

In my study area, there are now three cold storages within 20 miles. So farmers can store their potatoes within these cold stores by paying the rent. Now traders are interested in buying potatoes at the harvesting period to store in these stores. As a result, market price at the harvesting period remains at a considerable steady level. They are also getting seed potatoes for the local markets. So farmers are becoming more interested in growing potatoes on their land (Table 8.4).

From the above account, it can be ascertained that market forces play an important role in making agricultural decisions. Farmers have traditional means of storage and marketing systems and, also, are gradually linking them to modern facilities and with national and international markets. This is enabling them to get a better market price. As a result they are showing more interest in choosing some specific crops for their suitable lands. By improving the other associated facilities and disseminating market information more readily to the 'grassroots' level, the bargaining power of farmers could be increased. This would affect the decision making process of farmers.

8.4 RURAL FINANCE FOR FARMERS

8.4.1 Introduction

Finance is a critical factor in the rural economy. Rural people mobilise their financial assets both in farming and non-farming activities to achieve a better livelihood. As most of the rural households are both directly and indirectly related to agriculture, the availability of finance plays an important role in agricultural planning. It is obvious that better off families can manage their crops better than those have deficit budgets. Although most of the families have a tendency to maintain their enterprises within their capacity, sometimes, it was observed, they needed assistance from other sources. In the peak crop growing season, and in lean period, they have to seek assistance (Bathrick, 1981; Gill, 1991; Chowdhury, 1998). Basically Bangladeshi farmers are subsistence farmers who have negligible or no surplus money to save at end of the year. Moreover, nowadays, all agricultural inputs such as fertilisers, insecticides, related machinery and their replacement parts are becoming expensive. In my study area, the majority of farmers suffered from a cash shortage and without cash or purchasing capacity for inputs, they have to borrow cash, or things from different sources, in order to manage their crops. There are several sources from which farm families can get financial services. These are: formal, semiformal and informal institutions and each institution have an impact on rural livelihood, particularly on agricultural planning. This section intends to explore how people are using those financial services in making their cropping decisions.

In this section, formal institutions mean the national commercial and agricultural development banks. These institutions are guided by the rules and regulations of the central bank, the Bangladesh Bank, of the country. The semiformal institutions are non-governmental organisations (NGOs), such as Grameen Bank, Bangladesh Rural Advancement Committee (BRAC), Association of Social Advancement (ASA), and some other non-governmental organisations. Besides these, the government's co-operative based lending programme, such as the Bangladesh Rural Development Board (BRDB), RD-12, etc. also are included in the semiformal institutions. These organisations practice financial transactions with or without minimum formal financial regulations. The non-formal institutions are the traditional money laundering system such as relatives and friends, traders, input dealers, shopkeepers, traditional money lenders, etc. who do not maintain any formal regulations and who remain outside the government system.

Each of the above systems has some positive and negative impact on rural livelihood. As I observed, the rural credit system is very complicated and farm families are intertwined with this system in very a complex way. It is unpredictable and difficult to find out when a farmer, for how long and with whom, is getting linked to this credit relation. This section will discuss the relationships and their impact on farmers' agricultural decision making process.

According to a rural credit survey in 1985, formal lenders accounted for 19 per cent of loan transactions in rural areas compared with 72 per cent by informal lenders and 9 percent by semiformal lenders. According to BIDS- World Bank, 1991-92 survey, formal lenders provided 34.6 per cent, semiformal 43.8 per cent and informal lenders

21.7 per cent (Khandker, 1998). These figures suggest that there has been a significant reduction of non-formal lenders and increase in the role of semiformal lenders within 5 or 6 years. However, my experience in a village allows me to say that non-formal credit is still prominent in rural areas, which will be discussed further in subsequent sections of this thesis.

8.4.2. Historical Background of the Agricultural Credit System in Bangladesh

The first institutional credit, known as Taccavi Loan, was started by the Agricultural Loan Act of 1885 by the then British government as relief payment to meet the natural calamities and the farmers were not required to repay that payment (Rahman, 1991). Before this, the rural finance was controlled by the non-formal lenders such as landlords, *mohajon*, moneylenders, etc. at that time (and also for some time later) the interest rate was as high as 300 per cent. It was difficult to bear this load and farmers most often wese forced to dispose of land due to this debt. The 'Usurious Loans Act' of 1918 and 'Bengal Money-lender's Act' of 1933 were aimed at curbing the power of professional money lenders and keeping their charges within a limit (not exceeding 10 per cent), which, in reality, never worked in rural areas as interest rate remained above this rate. After Partition in 1947, the East Pakistan Provincial Co-operative Bank, was established to enable the farmers to obtain formal credit but it failed to achieve its aspiration. In the sixties another attempt was made based on the Comilla Model by forming *Krishi Samabaya Samiti* (agricultural co-operative committee) in each *thana* by allocating loans to farmers, but this system also failed to reach the needy farmers. Instead, well-to-do farmers dominated this committee and obtained advantage from this opportunity (Adams, 1980; Khandker; 1998)). After liberation, in 1973, the Bangladesh Krishi Bank (Bangladesh Agriculture Bank) was established which took

over the role of former Agricultural Bank of Pakistan (established in 1961) and began to deliver loans to the farmers. In support of Bangladesh Krishi Bank, six other nationalised commercial banks were also set up to provide loans to farmers. For loans, farmers have to use their land as collateral. However, these initiatives actually provided help to the wealthier farmers rather than assisting the poorer farmers who actually needed credit.

8.4.3 Formal Banking for Farmers in the Study Area:

The Rajshahi Krishi Bank (RKB) is the other name for the Bangladesh Krishi Bank (BKB) in Rajshahi region, who has similar activities as the BKB. Basically, this bank is delivering agricultural credit to land owners in my study area. Other nationalised commercial banks such as Agrani bank, Janata bank and Sonali Bank, etc. are also operating in this area. However, their activities concerning agricultural credit are not so visible. The interest rate of these loans varies from 15 to 20 per cent, depending upon the type of loan. Land-owning farmers used to draw agricultural loans from these banks when they feel in urgent need to manage their crops. However, this system has some drawbacks, which I discovered after discussing it with the local people.

In its credit programme, the bank authority delivers loans on the assumption that credit is inversely related to asset ownership. So they prefer larger borrowers to avoid risk. Moreover, as land would remain as collateral, poorer farmers have been excluded from the beginning of this initiative, as they have little or no land of their own. Whereas, these farmers are, actually, in dire need for credit for managing their crops. Beside these, there are some other problems with this credit programme:

- There are some costs involved for processing and travelling to attain the application. They also need to pay some bribe money (it is an open secret that one has to pay 10 per cent of the borrowed money) to get the credit.

- As land is collateral with this bank, some farmers, who need to get loans, are afraid of showing / submitting papers to others or to banks in the belief that some one might defraud him and may take over the land from him. Some families, also, do not have proper papers and, ultimately hide their financial status from the public and, consequently, fail to get loans.

- To get a loan from the bank, they need some influential person who is known to bank manager and can vouch for them so that they can get a loan. Sometimes it is difficult for small or medium farmers to get a suitable person who can do this for him. Instead, he (influential person) might be interested in offering loan himself to the farmer at a higher interest rate.

- There is lack of supervision by the bank's authority over the operation of this loan. As a result farmers, sometimes, use this loan for another purpose. I know at least one person in Ujankhalsi who drew a loan from the RKB and later disbursed this loan to some poor farmers at high interest (about 120 per cent). That person is a recognised moneylender in this village.

The aftermath of obtaining credit is sometimes very distressing. When any natural calamity occurs, the government sometimes declares some reduction in the repayment of this loan. A other times, it also politically misleads the people regarding repayment of loan by suggesting that they will not have to be repaid or else at a very low rate. This happens, mostly, before a general election when ruling party wants to attract voters to them. With the implicit belief regarding this relief, sometimes farmers do not repay their loan regularly and in times it becomes a huge debt, which is difficult for them to pay without selling any asset.

In fact, the formal banking system has an impact on agricultural resource management, particularly in the decision making process for some wealthy farmers, but it fails to reach the poorer farmers who are in the majority and, actually, need credits for the better management of their resources. The results over three decades indicate that these banks, in fact, benefit only the large and middle class farmers who took loans at a commercial rate from these banks when in financial difficulties.

8.4.4. Semiformal Credit System

The failure of formal institutions to reach the intended beneficiaries, as well as to achieve their economic viability, has led to an alternative institution evolving, i. e. the non-governmental organisations (NGOs) deliberately providing loans to the small group of poor farmers (Goetz and Gupta, 1996; Hashemi *et al*, 1996; Greeley, 1997; Wood, 1997). The founder of this micro-credit programme is Prof. Yunus, who gained direct understanding of the liquidity problem of the poor and their entrapment in usurious relationships when trying to overcome any endemic problem and who have, undeniable, difficulty in gaining access to the formal banking system. The Grameen bank was established in 2 October, 1983 (Chowdhury, 1998) and after that hundreds of such non-governmental organisations have emerged who are providing credits to the poor people in rural areas, without any 'economic' collateral. The basic principle of these organisations is similar and differs from Grameen Bank only by name.

These NGOs offer loans to the landless[6] people for certain income generating activities. It is a group-based lending programme. In that, not only the borrowers, but

[6] The landless have been defined are those who have not own more than 50 decimal of cultivable land or total amount assets per household other than land not more the value of 1 acre of medium quality land of the respective area (Chowdhury, 1998).

also all members of the group, are responsible for repayment of loan (Chowdhury and Alam, 1997). In this programme, the main targeted group is women. They do not need to go to the office rather the workers of the organisation go to them. It is a weekly-based repayment system and borrower must have to pay her instalment (*kisty*) on the fixed date (Hashemi and Morshed, 1997; Wood, 1997). Delaying the repayment of the instalment disrupts the circulation of loan among group members, but may recover by paying a fine within a short period of time. In most of the cases, the group has a group fund and an emergency fund. In special circumstances, or in an emergency, a member can borrow money from there with the consent of other members. Normally, there are strong supervisory measures to ensure that the use of loan is for allocated areas and the instalments are paid. Nowadays, this micro-credit system easily reaches the poor people in the rural areas of Bangladesh by replicating the above features and, consequently, it has a significant impact in mobilising resources there. The main aim of these initiatives is to empower poorer people, particularly, poor women to bringing them into the main stream of development (Yunus, 1994, 1995).

Ujankhalsi, like other villages of Bangladesh, has some experience of these credit programmes. The Grameen Bank, BRAC, ASA and CARITAS have been working in this village since 1994. Among these, Grameen Bank has one group, BRAC has four groups, ASA has two groups and CARITAS has seven groups. Except for CARITAS, none has credit programmes for men. This organisation has three men's groups. The main area of loans sanctioning were for poultry, cattle management, duck rearing, homestead construction, petty trade, etc. All are income-generating activities. None has any programmes for crop management. However, part of this loan goes to the crop management, which we will see latter.

These organisations grants credits to their group members, sequentially, by establishing an understandable time cycle for the members (Rahman, 1999). The workers of the respective organisations, observe the borrower's behaviour regarding its utilisation and after successful completion of full repayment, one is entitled to obtain the next loan (Figure 8.4).

Figure 8.4 A woman is paying *kisty* (instalment) of her loan to an NGO worker.

Along with Rokeya's success story there are some complicated stories, which will be related later. However, there are some other factors relevant to this study. These are: the rate per *kisty* and its total number as well as the '*seba mulya*[7]' (service charge) varies with the type of loans; there is no specific loan for crop management; borrowers often divert loans from allocated areas to other areas, such as for crop management, consumptions, etc.

[7] NGO worker does not say it is *Sud* (interest). This is because interest is a commercial term particularly, in Bengali cannotation, *sud* is used for more ill sense - usury. *Sudkhor* means living on usury, designate to professional moneylender also used as slang for any hurtful people. *Seba* means service without any meaning i.e. they are helping poor people for overcoming hardship - so its charge is *seba mulya* (service charge), not *sud*.

This could be illustrated by the following example (Box 8.1):

Box 8.1

Rokeya, wife if Atahar, a poor woman, who is a member of BRAC. She is also the cashier of the group to which she belongs. Over time, she received several loans from the organisation, which she used for the well being of her family. For the first time, she borrowed 2000.00 Tk. for keeping poultry. The *kisty* (instalment) was 22.00 Tk. per week for 52 weeks. She bought some hens to incubate eggs for selling chickens and to sell eggs with a part of this money and the rest she gave to her husband for purchasing fertilisers and insecticides and also for buying some paddy for food grain. Her earning was good and she successfully repaid the instalments and subsequently applied for the second loan of 3500.00 Tk, which she got. This loan was for purchasing a cow for milk and to get calves. At this time the *kisty* was 25.00 Tk. per week for 46 weeks. For first couple of weeks, her husband arranged the *kisty* by borrowing 800.00 Tk. from a money lender and next, she, along with her husband's income paid the rest of the *kisty* and, also, successfully applied for a house construction loan for 7000.00 Tk.. She spent only 3000.00 Tk for building a new house and with the rest of the money she purchased 2 decimal of land where her husband could cultivate banana. She also gave some money to her husband for managing their crops. The instalment was 53.00Tk. per week for three years. Her husband helped her to manage the repayment money either by selling crops and his labour. Within this time she again applied for a general loan of *Taka* 3000.00. As she has become a trusted member of the group, she was allowed to apply for another loan. She received it and she used it for the dowry of her sister-in-law. In early 1999, she was pursued by the BRAC field manager to establish a poultry farm. She agreed to this and got 5000.00 Tk. loan for it. The BRAC office supplied baby chickens, their feed and vaccinations, which were included within this money and gave the rest of the money (2500.00 Tk.) for constructing a chicken house. She constructed a chicken house with 800.00 Tk. and spent the rest 1700.00 Tk. for purchasing a second hand van for her husband. This is because Rokeya thinks it is better to be a van puller than of being a agricultural labourer.

Rokeya related her experience with BRAC as: " the first time when BRAC came to us for forming a group we refused it. This was because we heard that they were going to establish another group in our neighbouring *para* (*Paschim para*), we waited to see their activities. After six months they came again and we agreed to form a group. From then, I'm with BRAC. I'm happy with this and it has changed my way of living." However, it has created conflict with her rich neighbour. Because her husband used to work for them as a day labourer and she, sometimes, worked for them during post harvesting activities. Now she does not have any time to work for them and her husband has little time to work for others except for his agricultural work (although he is a sharecropper of this rich farmer). Moreover "they do not want to see us as independent from them", says Rokeya.

According to the workers in these organisations the '*seba mulya*' ranges from 12.5 per cent to 17 per cent depending upon loans. It is obligatory contribution of 5 per cent for the group fund and 5 per cent for the emergency fund. They will get this money back (for group and emergency fund) along with normal bank interest. Moreover, a woman is obliged to pay her *kisty* just 6 days after getting a loan. It is practically impossible to start an enterprise within a week after getting a loan and to make money from it. So in true sense, a poor woman who is taking a loan for her income generation, has to start her income generating activity with a deficit capital. Moreover, due to the prevailing *kisty* payment system, in real sense, one is not paying the *seba mulya* at 12.5 or 15 per cent.

In a study, Khandker (1998) shows that semiformal agencies finance 60 per cent of rural non-farm activities. For livestock it is 25 per cent and for crop activities it is only 7 per cent. Due to the lack of savings and access to credit, small farmers operate at subsistence level or rely on other sources of money, such as leasing. Recently BRAC expanded its loan towards agriculture in my study area. They started to provide loans for producing good quality seeds for certain crops such as onion, chilli, and some vegetables, etc. In this programme, farmers have no freedom to sell their seeds in the open market. They have to sell it to the BRAC centre just after harvesting period at the prevailing price of the market. Only three farmers in Ujankhalsi showed interest in getting this loan in 1998/99 *boro* season. This is because the price of onion seeds is at least 5 times higher in sowing period than in the early harvest. As there is no suitable agricultural credit and farmers need finance to buy their inputs. They often transfer a part of their loan to manage their crops and to do other important work. Farmers also insist on their wives or other adult female members becoming members of an NGO so

as to get credit. This might help farmers, who have this opportunity, to set up a suitable crop plan considering the availability of this credit. However, this credit system is weakened due to the transfer of money and the return from their established enterprises is certainly lower than it would be from the set purpose of the loan (Jansen, 1987; Bourdieu, 1990) and, as a result, borrowers have to seek money from other sources such as money lenders, landlords, etc. to pay the *kisty*. This is an emerging problem in rural poor communities. In other ways, it helps to increase the influence of the moneylenders in rural areas. This credit sometimes is invested into the traditional money lending business. It came to my knowledge that two women in this village use this credit in their secret money lending business. They provide money to borrowers with a interest rate of 10 per cent per month.

Although there are regulations for the strict monitoring of the operation by the NGO workers, in my study area, however, this monitoring is largely ineffective. They often complain that organisation is increasing their daily workload and it becomes difficult to maintain the supervisory work in a practical sense. Instead of doing that, they place emphasis on collecting *kisty*. As they need to show the high recovery rate (as much as 98 per cent) to the organisation to demonstrate their performance, they do not need to know the source of the *kisty* money (Ahmad, 2000). Moreover, the organisation is always under pressure to deliver more credit to more groups. In order to maintain this view, workers now concentrate less on finding the real needy families, but rather they prefer to select more solvent members to ensure the repayment. Sometimes to do this, they insist on their known male members sending women to form groups. This breakdown in the supervisory mechanism enables borrowers to transfer their loan to

other non-sanctioned areas (Jansen, 1987; Bourdieu, 1990;), which ultimately, creates social problems in rural areas (Rahman, 1999).

The overlapping of the activities of the NGOs is common in rural areas of Bangladesh (Akhter, 1997). In the studied village, four NGOs are working there. Although during group formation, NGOs workers should ensure that none of their members remains active with other NGO, in practice, the group members sometimes hide this and become members of more than one NGOs. By doing this, they take loans from their respective organisations and try to pay their *kisty*. Most often they face problems in maintaining the *kisty* of two or more organisations at the same time. As a result either they become defaulters or seek loans from moneylenders to continue the *kisty*. Sometimes it becomes a major problem for the families. I came to know about five women in this village who were the members of more than one NGO (Box 8.2).

Box 8.2

Assia, is a member of CARITAS and BRAC simultaneously. She first became a member of CARITAS and got one loan of 1000.00 Tk. When she was repaying her *kisty* for this loan, she became a member of BRAC and tried to get a loan from there, but failed. After completing the repayment she tried to get for the second loan from CARITAS and got 3000.00 Tk. for buying a calf. She leased[1] a calf from a rich family and showed that to the NGO worker as her newly purchased calf. From her loan she bought a piece of land of 3 decimal. As she invested this money where there was no immediate return, and as she needed to pay the *kisty*, she applied for a loan to BRAC of 2000.00 Tk. for poultry keeping and got it. Her husband is a day labourer and does not have enough income to pay the regular *kisty*. For the first couple of weeks she managed the *kisty* by this money. However, to manage these *kisty*, and to buy food stuff, her husband borrowed 1000.00 Tk from a moneylender with a interest of 10 per cent per month and soon she failed to pay regular *kisty* and again her husband had to borrow 1000.00 Tk. by giving a piece of land about 5 decimals as *kot* (mortgage). This money along with her husband's earnings, she paid back the *kisty* on her two loans. However, by doing this, Assia and her husband lost the possession of this land (for the next two years) until they paid the money back.

Thus overlapping of activities of NGOs and relaxed monitoring ultimately creates problems for rural people. It is easy to take money from different organisation but difficult to repay them if there is insufficient income. Poor people are interested in getting money for managing their resources, but most of the cases; they fail to repay it, as we have seen in the case of Rokeya and Assia. As they are bound to repay the loan, they have to adopt different strategies to manage the situation, which, in some cases, endangers their livelihoods.

In agricultural resources management the availability of loans plays an important role. Farmers with this money can buy inputs in order to manage their crops or, with an arrangement, they can set up a crop plan on the basis of this money. However, in some cases it has proved destructive for them. Actually, without knowing the local socio-cultural and ecological complexity of the area, these organisations are replicating the same model throughout the country which has created some socio-cultural and economic problems, such as increasing the amount of dowry, increasing conflicts between borrowers and the traditional power structure affects the political influence of these organisations on the government, etc. (Rahman, 1999; Alam, 2001). In rural areas, in some cases, it is affecting resource mobilisation to the agricultural sector and, ultimately, influences the agricultural decision-making process.

8.4.5 Informal Finance

Initially, it was believed that in the absence of formal credit facilities, traditional money lenders were enjoying their monopoly business over the rural borrowers (Bottomely, 1964, 1975; Hefferman and Pollard, 1983; Basu, 1997). With this view, several institutions have been established which excluded poorer farmers and benefited

the wealthier farmers who did not need much credit in the real sense. On the other hand, to minimise the gaps, hundreds of semiformal institutions have emerged to assist poorer people instead of wealthier ones. Although the activities of these organisations involve the rural people, they exclude the absolute poor (hard core poor) people from getting credit (Sobhan, 1997; Gautam, 1998). They, also, fail to understand the behaviour of local people, their culture and ecological reality of the area and, as a result, fail substantially to decrease the influence of traditional credit system. This traditional credit is easy to get for, in most of the cases, no collateral is required, but it has a high interest rate. As it is accessible to all people who have existed within the locality for a long time, it can easily cope with the changing situation. It plays an important role in rural economy.

There are several credit providers and different types of credits under this informal system in the studied village:

8.4.5.1 Credits from Friends and Relatives

When people face any problem, they try to collect money from their own neighbouring friends and kin. Usually, no interest is expected on this type of loan. Fictive kin along with *bongsho* (lineage) members are also important in providing help (Gangapadhya, 1964; Klass, 1966; Koss, 1958; Karim, 1990). In Ujankhalsi village this type of transaction prevails. People say it is *tan deea anechi* (brought it from elsewhere). It has been described earlier the case of Atiq and his friend (Chapter 3). In managing agricultural resources and in other crisis, kin and friends are one of the most reliable sources of credit.

8.4.5.2 Credit from Traders, Dealers and Shopkeepers

Traders, mainly grain traders, are one of the sources for providing loans to the farmers. They advance loans with the agreement that the borrower will sell his produce to him after harvest, at the current price rate. Locally it is known as *dadon*. The farmer who takes *dadon* is also obliged to sell his output to the respective trader. However, in many cases there is a difference between the current market price and the purchasing rate. Normally, it is less than the current price. Traders raise different issues regarding the quality of produce, trends in the market price, etc. and give farmers a lower price. Farmers have little say because traders are their source of credit in a crisis period so they have to maintain a good relationship with them. On the other hand, traders also need a sufficient supply of goods to run their businesses and get this supply from the farmers by extending loans. Although this should be a mutual, reciprocal relationship, in reality, these traders often exploit poor farmers.

Dealers of agricultural inputs are important sources of rural credit. These dealers mainly sell fertilisers, insecticides, high yielding seeds, agricultural accessories, diesel, etc. All these materials are essential to farmers for managing their crops. During the peak agricultural season (i.e *boro* season), farmers need these inputs and at this time they often have a shortage of capital. To cope with a crisis, farmers borrow inputs from them with an agreement that they will pay it back, in cash, after their harvest. This is a very common form of borrowing in rural areas. As farmers are taking materials on credit, they are obliged to agree with the price fixed by the dealers and, normally, it is higher than the current price. Farmers know this will occur, but they have to agree with the conditions laid down by the dealers, due to their crisis situation. On the other hand, dealers know that not all money will be collected from their borrowers after harvest

and some loans might take years or will never be repaid. With this in mind, they fix the price of their goods. Some of these dealers have a grain- trading business as well. In such case, they also make contract with their borrowers to sell their produce to them at the current market price and treat them as the traders do. So in this case, farmers are being exploited by the same lenders in two ways.

It was observed in the studied village that dealers also exploited poor farmers in other ways. In this area, the inputs dealers have a great influence on farmers. When they have any problems regarding their crops or soils, they discuss this matter with the dealers instead of going to the Extension Services. However, as these dealers have very little education or proper training in agriculture, they only have their business experiences to rely on. With this experience, they provide advice to farmers for using certain types of fertilisers or insecticides with the aim of expanding their sales. In this way they also exploit poor farmers by giving them goods on credit.

The most widely used system of credit in rural areas is that obtained from shopkeepers. Here shopkeeper means the seller of groceries, vegetable, medicine, cloths, foodstuffs like rice, cooking oils, etc. Even people can have tea from the tea stall on credit. Most of the rural families are involved in this credit system. These retail shops sell goods on credit only to their regular customers, thereby, and maintain their size of the market (Basu, 1997). For setting up the price of their goods, they also consider the situation as it is done by the grain traders or inputs dealers i.e. fix comparatively higher for their saleable goods when farmers go for buying those in credit. They pay back those at their harvest.

8.4.5.3 Credit from Moneylenders

When people fail to get necessary credit from formal, semiformal institutions or friends and relatives, people look for credit from the moneylenders. In this money lending system, to which all socio-economic groups have access, the interest rates are very high. The rate is around 120 per cent (10 per cent per month), although it can vary from person to person and types of loans. In some cases it requires collateral[8], but in most cases, it depends on personal relationship and trust. Most of the moneylenders live in the same or neighbouring village and, normally, both parties maintain a good relationship. This is an interdependence relationship where moneylenders are gaining their profit, as *sud,* from the borrowers and, on the other hand, borrowers are getting help in the crisis period to manage their crops. Some landlords also act as moneylenders to their sharecroppers.. Although the mode of payment varies from lender to lender, it ranges from money for money, money for crop produce, crop for crop grains and crop produce for labour.

In the money for money lending scheme, the borrowers will have to return the money with interest within the agreed time frame. If one fails to return payment, at least he has to pay the interest first and later the capital. The agreement is normally formalised between two parties either in written or in verbal form in the presence of *pradhan* or *pramanik* or any other reliable person. Money for crops refers to the lenders will provide money and borrowers provide an agreed amount of crops after harvest. For

[8] There are some professional moneylenders in rural areas who lend money by collateral with some assets like ornaments, land, other resources. The value of this collateral is higher than borrowing money. When the agreed time expired, the *mohajon* do not return that assets back to the borrowers. In absence of them, they are known as *sudkhor*. People hate them due to their hurtful activities. Some people of Ujankhalsi dislike them so much that when they find any disease on their jute crop, they write down the names of five bad *sudkhor* on four tags and hang those tags four corners of the infected plot with a believe that disease will disappear soon. This symbolic behaviour indicate the intensity of antipathy towards this *sudkhor*

example, if one borrows 150 TK from a lender, he has to pay one *mound* (40 Kg) of which is equal to 280 *Tk.* at that time. This is the most common form of money lending system in the Ujankhalsi area. In case of crop for crop lending, loans are advanced by the lenders for consumption purpose and the borrowers have to pay back with some extra crops as interest. For example, if one borrows one *mound* of paddy in a crisis period, he has to pay back two *mound* of paddy after harvest. Here interest is equal to the amount of produce within a couple of months.

In case of crop produce for labour, borrowers are obliged to work for lenders without payment in order to repay the debt. Mainly very poor people accept this loan and the amount of loan is not so high so it is easily repayable by the borrowers by working for the lenders.

Normally landlords prefer to advance loans to their sharecroppers for produce to secure their interest. Normally, the sharecropping arrangement is a risk-sharing strategy i.e. they share the risk of crop loss with their tenants. Due to this crop failure, tenants' capacity to repay can decline. As landlords' income depends on tenants' productivity, they advance loans to them to keep them productive. We have seen this type of loan in case of Rahman in the previous chapter (Chapter 7). Thus, while landlords depend on tenants' productivity for their income, tenants also depend on their landlord for their working capital and in some cases for subsistence. In case of crop for labour, landlords are also willing to provide loans to poor tenants because this will ensure him obtaining manpower for his own farm, which, in turn, provides assurance for his own income. This relationship is interdependent. However, when landlords are taking extra benefit from this interdependent relationship as *sud*, it links the sharecropping market into the

credit market (Bardhan and Rudra, 1978; Basu, 1997). The close linkage of these two markets also gives rise to the political power of the landlords in the community (Jahangir, 1981). The landlord gains this social capital by extending loans to his tenants. So in terms of crop management and crop planning all these complex relationships play important roles.

8.4.6 How Does the Rural Financial Market Operate

The above discussion provides evidence about how the credit market operates in a rural agricultural community. In this credit market, all people do not have equal access to the necessary credits. Different forms of credits have different ways of accessing them and poor farmers have limited access to most sources so tend to accept the informal one. The failure to understand the socio-ecological reality, is where the formal and semiformal system fails, significantly, to reduce the influence of the informal money lending system. Earlier it was thought that technological changes would be able to reduce the dependency of poorer families on the informal credit system, and that they would get more produce, and create more employment opportunities (Bhaduri, 1977; Hussain, 1991; Rahman 1991). However, HYV technologies require more inputs and it is sensitive to any abnormality (disaster) and the poorer farmers have less capacity for taking advantage of this technology. Actually, the rural credit market is complicated, as is shown in the above account, and it becomes more complex than it was envisaged earlier (Roth 1979; Bhaduri, 1977; Rudra, 1998; Bell 1988).

In an agrarian community, different social groups work together. They have different perspectives. Even within the same social group, financial requirements vary from person to person. Farm families in similar circumstances require different amounts of

credit to manage their crops and to maintain their living standard. To get this, they have to offer different methods of repayment such as mortgaging their land, which is sometimes subject to risk when any shock or stress such as storm, flood, drought, etc. appears. At this time the situation becomes more complicated. People have to seek more credit from other sources to stabilise their situation. The interaction and combined impact of these credit systems often has a drastic effect on the farmers' livelihoods.

For example, if one poorer farmer takes a loan from one organisation to manage his crops, but due to storm and early flood his crops get damaged, he is forced to borrow more money or grains or both for his subsistence immediately. This would certainly affect his crop planning for the next seasons. Moreover, in the next cropping season, he is going to start his cropping system with a deficit capital. In this season, by default, he will have to borrow money from other sources to manage his crops. Even if he has a good harvest, the interaction of different credits and their combined impact will force him to sell his harvest at a disadvantageous early period to reduce his credit burden, or to become loan free. As a result he may become short of food soon after his harvest. So under these socio-economic and natural constraints, a farm family can suffer from shock or stress. In the context of my field experience, I observed this incidence when disasters such as hail storm, early flood, prolonged severe flood, etc. occurred. Those caused farmers to abandon their normal crop planning and forced them to set up new plans to cope with the situation. So before setting up any new programme, it is essential to understand the behaviour of local people and these new schemes should intend to provide suitable credit programmes for people so that they can attain credit for managing their resources.

8.5 SOCIAL ORGANISATIONS AND FARMERS

The structure of the agrarian community of Bangladesh comprises several socio-economic groups with their own political organisations. Several geographical and kin units such as *bari* (household), *para* (neighbourhood), *samaj*, *bongsho* (lineage), *goshthi* (kins group), etc. and in a wider context, *beparies / aratders*, *baboyshai*, *dealers*, etc. interelate in this community. In reality, different stakeholders are involved at different levels, their interactions play important roles in maintaining agricultural productivity. They have their own priorities and values which are tied together in pursuance of their interests. However, the activities of one group also affect the other groups as they are linked and influence agricultural decision-making processes. The main purpose of this section is to discuss how these groups work together in the agricultural decisions-making process of farmers.

8.5.1 *Bari* (household)

The *bari* is of primary importance when agricultural decisions are taken (see Chapter 3, section 3.3.1). Economic and social activities are organised within the *bari*. There is also a division of labour within this unit and each member has their own tasks for helping to continue, and maintain, the activities of the *bari*. Normally, the active senior member is the head of the household. This household head has the authority over all economic and socio-political affairs of the household. The amount of authority of the household head depends on his economic strength, personality, physical ability and expertise for carrying out, or supervising the necessary tasks. For example, if the household head has enough expertise in agriculture, he is expected to make the

cropping decisions for his household. If he has not enough expertise but another member has it, the expert member may take the responsibility for organising the agricultural activities. However, the head of the household should be informed and has the final say where to grow what and when. The number of adult male members of the household and the sources of household's income are also taken into consideration in determining this authority. If there is more than one earning members, or there are other economic activities remaining within household parallel to household heads, then the authority of the head is weakened.

Therefore, the internal composition of a household and the activities of its members are important in the agricultural decision making process. As it was discussed in earlier chapters a degree of cohesiveness exists between the members of the household. Usually, when family members work for the common household goals such as agricultural production, they work for each other without self interest.

However, some economists do not agree that pure altruism can exist in the home. They want to examine all activities in terms of utility function and economic self-interests. Folbre (1986) mentions that if altruism works in the home then why not in home as well as the society so as to achieve its maximum welfare? In fact, it is not wise to consider household activities as being similar to the activities of a market oriented production firm. This is because members of household are in a kinship relationship and are interwoven with residence, labour and property. The household can be seen as an integrated functional unit. So its all decision-making processes cannot be explained solely in economic terms. If it does so, this social relationship seems based on bloodless, economic interdependencies and the flow of goods and services along with

kin lines, which contradicts with the conventional wisdom of anthropology (Netting, 1993).

It is also not wise to consider that there is no self-interest among the members of farm families. It depends on the organisation of the family. The nuclear family originate on the basis of self-interest. After emerging as a new family, its members work for each other to manage the new situation. In the case of an extended family, when internal conflict arises in connection with decision-making or other economic activities, the family is on the verge of splitting as was illustrated above in case of Jamal and Kamal (Chapter 4, section 4.5.8).

When there remains more than one earning member, there is always a possibility for self- interest to emerge in that family and the process of agricultural decision-making may vary due to this reason. For example, Hazarat, Iasin and Iaqub are three brothers living in the same household containing one of the richest families in the village. Both are married, have children and have jobs. Iaqub, the youngest brother, has greater expertise in agriculture than his other brothers. Mainly he looks after their agricultural activities but, for making decisions, he has to consult with his other two brothers. The older brothers have separate sources of income, however, Iaqub, as well as having an outside job, does all the agricultural work for this family. For this burden he enjoys some privileges such as he being allowed to cultivate crops for his own advantage in some of the household's selected communal plots. He can makes decisions for these plots. Therefore in this family, self-interest can exist. The authority and process of decision-making varies then with families and their circumstances.

Another rich family, is that of Ismail who has three brothers. Except for the youngest, the other two are married. Osman, the second oldest brother has more expertise than other members, so he looks after their agricultural activities. Ismail, as the eldest brother, has the authority over his family's affairs. In this family, there is no parallel economic activity other than agriculture and family members work for each other. In case of crop planning, Osman discusses with Ismail about possible options and they make decisions together.

Here two rich families have different internal arrangements and their decision making processes are also different. Even within same family it can vary – Iaqub personally is taking the decisions for own crops and, on the other hand, for common cropping arrangement he discusses with his brothers. So internal arrangement of the household and its ongoing process are important in making agricultural decisions.

Women in the household, sometimes contribute to the decision making process. To undertake food preparation properly or to confront crisis period, they need to produce some specific crops. For example, for entertaining guest, they need special rice such as *kalozira*, *soli*, etc. and for some ritual or cultural activities they need to make special foods, which require varieties of grains, vegetables and spices. To them, pumpkin is a vegetable for crisis periods. During flooding or entertaining huge numbers of guests, they like to cook pumpkin and, also, they require mustard and common spices such as coriander, turmeric, chilli, ginger, etc. Before setting up their crop plan, they discuss it with male members of the household. People say "we do not want to buy anything except salt, soap and kerosene from the market for our livings". Although, actually, they have to buy more than these, they wish to appear that they can manage their

livelihood from their land. So they need to cultivate a wide range of crops for this. They do not need to make a list of crops to be grown, they know it from their experience or else from information received during informal discussions and so try to plan accordingly. Moreover, if any woman has any income generating activity, or has personal assets, like land, she can actively take part in the decision making process. For example, Rokeya helps Atahar in making cropping decisions and as I discussed earlier, Jharna insists on Iasin growing *kodom* on their land given to them by her father.

Now the household's relations to the wider social structure like the *para, samaj,* etc will be discussed.

8.5.2 The *Para*

The *para* is the neighbourhood. It comprises of several families. Normally, poor households cluster around those of a few rich families (Table 5). They may or may not be kinsfolk of the rich families. They stay around the rich families for their own advantage. The poor and small farmers have limited land to grow crops, but have sharecropping arrangements for the land belonging to wealthier families. During a lean period or after any shock, they may have limited food stocks and so often experience some shortages. At that time, they may have to borrow from a rich family to survive and must repay loans with or without interest. Here the sharecropper enters into a double relationship with the landlord, who allows sharecropping access to his land and gives loans in times of distress, which ensures clientage (Jahangir, 1979, 1981).

Table 8.5 Land ownership distribution between *para* in Ujankhalsi village.

Farmers' category	Sarker *para*	Purba *para*	Paschim *para*	Borgi *para*	Shaik *para*	Dokshin *para*	Fakir *para*
Rich	5	4	4	3	3	4	1
Medium	24	21	12	7	9	8	4
Small	27	28	14	22	13	9	6
Poor	64	50	48	29	16	20	3
Total	**120**	**103**	**78**	**61**	**41**	**41**	**14**

Most authors overlook other relationships that exist within this territorial proximity. These allow rich families to enjoy political power within and outside the village. They get necessary labour from their neighbours (poor families) for their farm land. This enables them to manage their land and crops more successfully. So it is possible to combine agricultural and other productive systems within these households and these serve as 'relationships of production' (Rudra, 1984; Basu, 1997). Moreover, when these rich families face any problem where they need some kind help from others, these poorer families are turned to first for their assistance (Figure 8.5). Therefore, a rich family need to have some friendly neighbours around their houses in order to protect their assets e. g. from thieves, illness or other emergencies and these poorer families are expected to provide such help. The rich family does not need or even is expected to pay as the rich farmer/ poor farmer relationship is one of interdependence. It is necessary to understand these relationships and their significance for rural resource management.

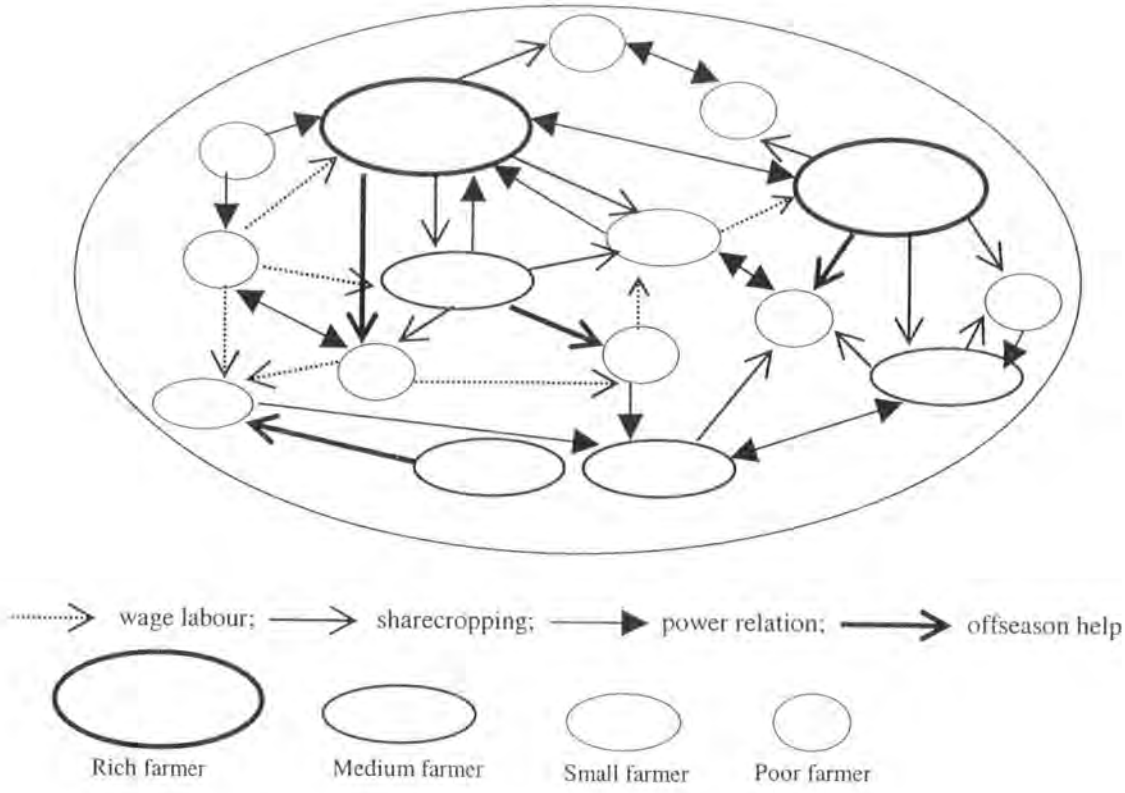

Figure 8.5 Diagrammatic representation of the interaction between *para* people in Ujankhalsi village.

The question then arises: How does this relationship influence the agricultural decision-making process? A rich farmer has land, capital but insufficient labour. When he has access to necessary labour, he can set up his crop plan on this basis. If he has not, he will have to plan differently (see Chapter 7, section 7.2.2.1). On the other hand, if a poorer farmer knows that he has access to land and capital from his rich neighbour, he can make decisions differently to those who have not. So these mutual, interdependent relationships within a *para* have influence on agricultural decisions.

8.5.3 Samaj

The main concern of this section is to discuss how the *samaj* influence agricultural decision-making processes in the study village. Most of *pradhan* and *pramink* are wealthy and have influence. They play an important role in managing resources by settling disputes among their supporters and taking decisions about some common events in the interest of the villagers, etc. How they influence agricultural resources in the study village will be discussed below:

Being wealthy men, they can provide land for sharecropping, creating opportunities for labouring and sometimes provide their supporters with short-term loans, with or without interest. For example, Nasir, the *pradhan* of *shaik para*, has given some of his land for sharecropping to his supporters. In addition, he helps his sharecroppers by extending loans without interest if they need them for crop management of his lands. Not all heads are good men and some attempt to exploit their supporters. Kena, a *pramanik* of *Pashchim para*, who is thought of as an unjust man, never appears to want to help poor people. He is believed to have had cheated people when buying land from them (registering 1 *bigha* instead of 5 *katha*). It is also claimed that he refused to pay back the people from whom he has borrowed and even tortured or threatened them if they asked for payment. When he heard that people were planning to select another *pramanik*, it is said that he gave money to some people and land for sharecropping and secured their support and, in turn, secured his political position.

Here two traditional leaders have different attitudes. Osiruddin is helping his supporters both from political and economic point of view; on the other hand, Hazarat's interest is mainly to secure his political position, however, there also remains some economic interest as well.

Disputes occur often among the villagers and many are related to agricultural issues. *Pradhan* and *pramaniks* are responsible for settling disputes among their members. Settlement is necessary to prevent further conflict among villagers about such issues. For example, a deep tube-well owner at *Purba beel,* accused a farmer of his *samaj* of cultivating paddy in the dry season for the last three years within his irrigation command area,[9] using water supplied from his DTW, without giving him any money or produce. It is expensive to supply water. The farmer cultivated 12 *katha* (18 dcml) of land in his command area. This is low-lying land into which water leaches when other plots are irrigated. This farmer was taking unfair advantage not joining the water supply scheme. The farmer said " it is my land, and I don't need any water. You stop your supply. Your machine anyway is often out of order. When you are unable to supply water and our crops are stressed who will compensate us? I'm a poor man, cultivating only this one plot and you will not help me." It is not acceptable to other farmers to obtain water in this way in a command area. After a long discussion, the *pradhan* decided that for the running year, the farmer could cultivate his plot without paying the DTW, but from the following year he must pay if he intends to cultivate the land and take advantage of the irrigation water.

As with this personal problem, *pradhan* and *pramanik* also deal with common issues related to their common interest. For example, Ansar, a DTW owner in the village, often requests the *pradhan* to arrange a meeting before starting his scheme. Most of the villagers who are within his DTW command area attended the meeting and took decisions about how the water would be supplied, how payment would be made, the conditions he intends to impose etc. All those involved have to agree to his proposal.

[9] Command area is the total area under the irrigation scheme of that DTW.

Nonetheless, sometimes he faces problems in distributing water and collecting all the charges. All these are brought into the meeting and the *pradhan* negotiated with Ansar on behalf of the villagers.

In this type of meeting farmers also make decisions what crops they should grow and where, because different types of crops require different levels of irrigation. So farmers along with water sellers take decisions in the presence of the *pradhan*, as to which area they can cultivate what crops. If there is any misunderstanding or conflict, the *pradhan* has to reach a solution agreeable to the participants.

In rural Bangladesh, the interaction among people is inevitable. There exist conflict and cohesion among people (Zaidi, 1970; Islam, 1974; Boyce and Hartman, 1983). Some of these have been examined by several researchers. They found that people came together under the leadership of traditional leaders when common interest was involved such as school construction, pond construction for irrigation and drinking water, for crop protection, etc., by forgetting their personal conflicts (Srinivas, 1955; Dube, 1955; Beals, 1955; Arnes and buerdens, 1974; Karim, 1990). Recently we have seen this involvement and attitude of the village *pradhan* in the workshop of LWI and its consequences.

So this traditional political organisation, *samaj,* at village level, has been playing an important role in resources management, particularly, in the decision-making process of farmers since earlier times.

8.5.4 Farmers' Relationship in Wider Contexts

From the previous discussions it is evident that the agricultural resources management in floodplain is not only a farming system it exceeds the farm boundaries. In this socio-ecological setting different users manage this bio-physical environment from different perspectives and also there exists a degree of interdependency. This section discusses this interdependency among different users in relation their resources management system in order to obtain livelihood.

In an agrarian community people are related to each other in many ways. In reality, a wide range of actors are involved in rural agriculture (Gass *et al.*, 1998; Ravnborg and Westermann, 2002). This not only includes farmers, but also artisans, local government bodies, NGOs, business enterprises and its personnel, researchers and implementation agencies, etc. Each set of actors has its own objectives, interests and values (Ashford and Biggs, 1992). All these organisations work together like the parts of a machine in which the farmer is in the central position. In the agricultural decision-making process each actor has its own as well as a combined role. So it is important to identify them in understanding their relationships with the system. This identification becomes important when conflicts arise between different groups of farmers and fishermen. It is soon becomes clear that a number of actors are tied together at different levels in pursuing their interest. This stakeholder identification adopts an actor-oriented approach in agricultural resources management (Long and Long, 1992; Long and van der Ploeg, 1994). In group discussions, I wanted to know, from the farmers, who are the persons related to them in managing their agricultural resources. The Figure 8.6 is drawn on the basis of these discussions.

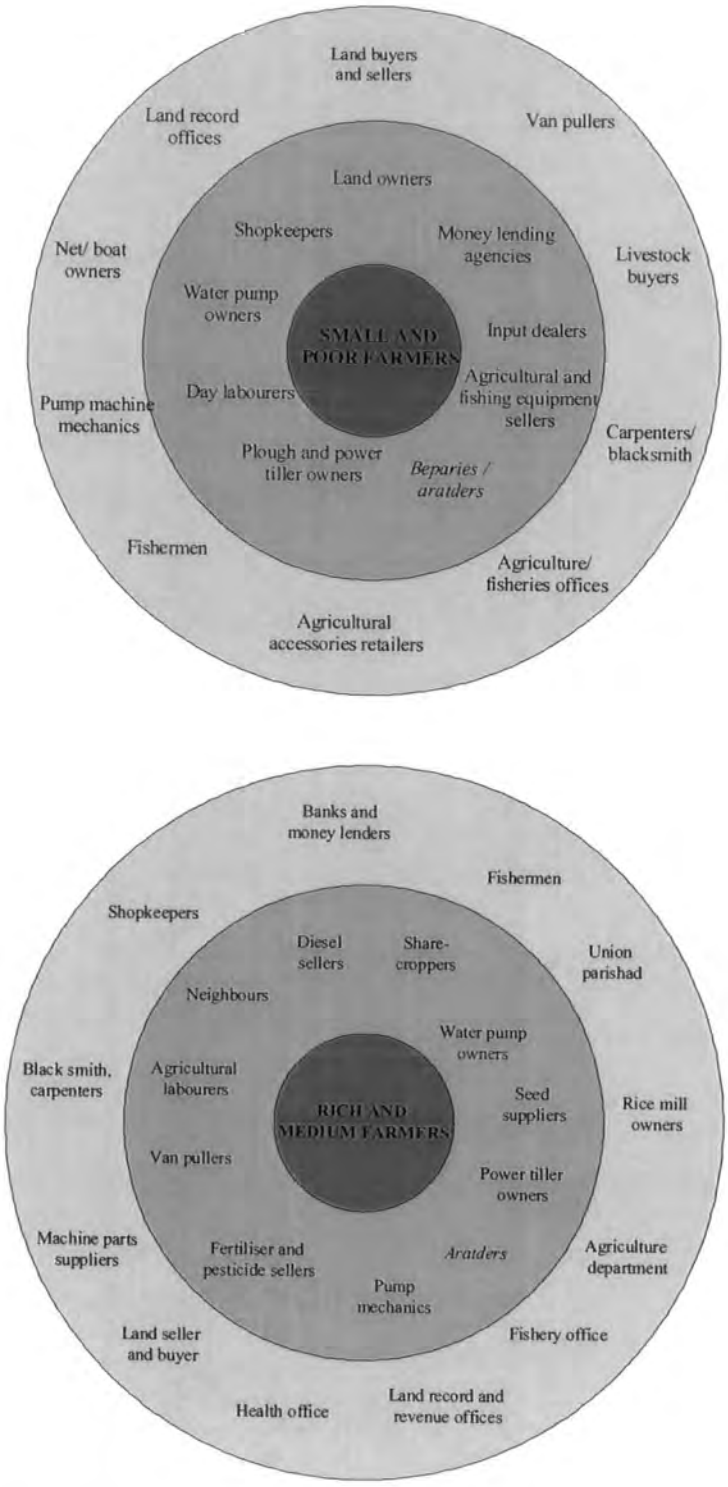

Figure 8.6 Farmers' relationship with other stakeholders in an agricultural community of Ujankhalsi village, Bangladesh. Note: Adjacent stakeholders have closer link.

From the Figure 8.6 it can be seen that there are a number of actors situated in different positions related to this system on at a different scale of dependencies. To small and poor farmers, the landowners, shopkeeper, moneylenders, *pradhan/ pramanik* are more closely related than are day labourers, van pullers, seed sellers or power tiller owners. They need help from different government officials, but is not so essential for them as it is for the rich and medium farmers. On the other hand, to the rich and medium farmers, day labourers, sharecroppers, van pullers, power tiller owners are important. This is because rich farmers have sufficient land and capital. They need labourers, sharecroppers, and power-tiller owners to cultivate their land and van pullers to carry their produce. Poorer farmers have less land and a deficit of capital. It would be beyond the resources of them to hire labourer, power tillers or van pullers. Therefore, they try to manage tasks using their own resources. As a result they are placed in a weaker relationship position. However, all groups think input dealers, *beparies / aratders*, water pump owners are closely related to them.

This relationship is important for understanding rural agriculture. This socio-economic embeddedness perspective allows us to consider how these relationships influence people's experiences and interpretations in their community (Granovetter, 1985; Guba and Lincoln, 1989). In the decision-making process farmers need to gain access to related resources, local political bodies, marketing facilities and associated bodies, at different times to run their enterprises. By doing so, they gather experience in facing constraints and opportunities which they translate into their decisions. The identification of these interdependencies is an essential basis for dealing with natural resources management effectively and, certainly, it demands a holistic approach rather than sector based approach to be understood.

8.6 CONCLUSION

Due to the seasonal agricultural activities in floodplain areas, different social groups react differently with the fluctuation of related factors such as labour, market price, etc. Farmers try to cope with this by changing cropping decisions from the point of view of consumption and possible profit. There is, also, a lack of a suitable agricultural credit system in rural areas. Poorer farmers often face shortage of capital in managing their farming activities. As a result, they seek help from traditional lending institutions but to repay these loans they are forced to sell their produce at a very minimum price which ultimately, pushes them further into debt and to being obligated to certain persons. Although there is a government procurement policy, due to the failure for it to be administered properly, poorer farmers fail to get benefit from it. On the other hand the wealthier farmers are, comparatively, in a better position. They are able to refrain from selling their produce until a suitable time when price goes up. Therefore, when making cropping decisions, the poorer farmers, have to allow for the possibility of having to sell their produce at a less favourable price.

From the above discussion, it is also clear that households in the studied area are embedded in multi-stranded relationships within the community and beyond it. At one hand there exists conflicting and contradictory interests, and on the other hand interdependency, symbiotic relationships prevails among different stakeholders. The household, the decision-making unit, remains in a central position. The nature of decisions largely depends on the assets it has, the ongoing process within the unit and its demands. Although the decision making process seems to be the personal choice of the household, however, it is not absolutely independent. What other actors are doing

is important to the decision-making unit. This is because there are many functionaries within an agrarian structure and the whole structure works together to continue the process. So what is needed is a holistic approach in order to understand the economic, socio-cultural and political relationships of the decision making process of farmers.

9. CONCLUSION

The Bangladeshi family farm is the basic unit of production and consumption. Different households have different goals and they try to attain their goals from their socio-economic point of view. The general rule of these families is to produce sufficient rice and wheat for food and obtain some cash from the marketed-produce to buy other necessary items. Although poorer families always face difficulties in attaining this goal, due to their limited resources, they try hard to achieve it. As long as the household does not face any problem such as crop loss or any unexpected expense, they can maintain themselves by practicing their normal production strategies. When they do face any problem, they change their normal strategies in order to address and mitigate the situation.

Ujankhalsi farmers can illustrate the changes, which have occurred in this locality in the recent past. The conversion from unaffected, wild wetlands to irrigated paddy fields entailed a change in their farming strategies. They can recall how they had to face new opportunities and constraints in the changing situation and how they are now learning to cope with the situation in order to achieve their livelihoods satisfactorily. As a result complex relationships have emerged among people and between people and the natural habitat.

Local people build up their knowledge from personal experiences either from their actions by participating or observing other's performance and having information

passed on to them. Their mental map is made up by these factors reinforced by their religious beliefs and the local values. This is their indigenous knowledge with which they interpret their world. They learn and follow the rules of farming activities since their childhoods like British boys learn and follow the rules of their language. It is how a person interprets his / her experiences and the mental framework by which he / she perceived. This perception is always selective - it comes through the methods and acts of observation, habit of thinking and mental frame into which one fits information. It is more personalistic, diverse and complex than generalised in nature. On the basis of these perceptions they make decisions what to do when and where to obtain livelihood.

From the different chapters in this thesis, it is clear that floodplain framers have a vast experience about their environment and suitable farming activities. Farmers with their experience have developed strategies for handling the problems that regularly occur throughout the agricultural cycle. The routine of cropping decisions also involves the possibilities of unfavourable outcomes. However, when they face any unexpected event it provokes a feeling of uneasiness to deal with this, consequently, they either delay to act on it or look for suitable alternative option to overcome the situation. The acquired mental perception, which comes through experience, enables them to make an alternative choice suitable to manage the situation.

From the discussion in the chapters, it is obvious that there exists a multi-resource use pattern among the villagers. This thesis also shows that both farmers and fishermen are under a number of pressures. These pressures are notably due to the greater shortage of land as population continues to increase and the impact of different government interventions such as Flood Control and Drainage and Irrigation Programme. The main

aim of this intervention is to increase rice production by intensifying the land use pattern. The changes in the production system by introducing new technologies have largely been positive, resulting in the growth of agricultural productivity (Palmer-Jones, 1999). However, this achievement has been gained at the expense of other floodplain dwellers, notably the fishers (Barr and Gowing, 1998; Sillitoe, 2000a). It is also apparent that it not only affects fishers, but these interventions have brought about a number of associated problems which directly and indirectly affect the floodplain production system.

Along with the decreasing soil fertility in the *beel* area, water congestion inside the *beel*, the drying up of *beel* in the dry season is seen as an important factor affecting the floodplain ecosystem. The dry *beel* is now being used for cultivation and people focus on the production of paddy rather than fish. This has also intensified the decline of fish species as well as aquatic vegetation around *beel*, which is a source of wild food and building materials for poor floodplain dwellers (Barr *et al.*, 1996). By paying more emphasis on HYV paddy, there is a marked reduction in crop diversity. The cropping system has now become more HYV rice based.

On the other hand, farmers need flexible options to make appropriate crop choices in this unpredictable climate. Nowadays this has reduced significantly. This study also shows that although these HYVs have a great yield potential, they entail a great risk in their production in this unstable environment. This, in turn, has led their livelihood to become more vulnerable. Not only the floodplain dwellers, but also the country's overall economy is now at risk due to this, as a major portion of the industries in Bangladesh are dependent on the raw materials from agriculture. Therefore, any

dramatic fall in agricultural production could drastically affect the country's economy. Therefore, the sustainability of self-sufficiency in rice production is now in question.

The above mentioned commodity-oriented development was established without knowing the local ecological realities and, also, ignoring local people's knowledge and behavioural attitude. Actually, those development practitioners had lacked a collective understanding of the nature of 'floodplain production system' or 'natural resources system'; rather they narrowed down its meaning and characterised it as simply a 'farming system'. Basically the floodplain livelihood strategy, while employs the decision-making processes of the people, is very complex. In this ecological domain, different stakeholders have different socio-economic strategies, which are interdependent on the existing ecological factors. As they are interdependent, any alteration in one factor has an impact on one or more of others.

The traditional agriculture has been evolved which is well adapted in the locality from ecological, technical and socio-cultural point of view. However, when any new intervention is introduced into the locality, it might increase risk and also need time to adjust with the situation. Schultz, for example, states that

> "... it is possible that traditional agriculture has certain strong built-in resistors to any changes in the existing state of the arts. The concept of traditional agriculture implies long-established routines with respect to all production activities. Introducing a new factor of production would mean not only breaking with the past but coping with a problem, because the production possibilities of the new factor will be subject to risks and uncertainties as yet unknown (Schultz, 1964: 33 quoted from Johnson, 1981: 109-110)".

A similar situation has occurred in the floodplain of Bangladesh. People were adapted to their traditional system and have gained efficiency within it. However, with the

introduction of new technologies a number of problems have arisen. Therefore, it is essential to know how local people accommodate themselves within their environment; how they construct their knowledge; negotiate and update it with the changing situations. Without acknowledging this, the researchers and development practitioners claim that farmers have a lack of understanding of the dynamics of the system, have limited ability to identify their constraints and, as a result, fail to obtain the 'proper benefit' from the interventions (Chowdhury, *et. al.*, 1993; Ministry of Agriculture, 1997; Rahman and Thapa, 1999).

As is evident, the floodplain production system of Bangladesh has been changing rapidly over the past 20-25 years due to floodplain modification through engineering works and intensification of rice production, as well as population pressure. This does not mean that farmers have failed to perceive the dynamic nature of the floodplain. As people have lived there for generations, they have built up a viable system for exploiting its resources and so to claim that they have a lack of knowledge about their situation cannot be justified. They do lack familiarity with these introduced technological interventions but are able to determine why they are unsuitable and incapable of addressing the local sustainability.

As pointed out in earlier chapters of this thesis, to understand the agricultural decision-making process, it is necessary to study the opportunities and constraints from the farmers' point of view and how they resolve and simplify these constraints (Conklin, 1967; Nazera-Sandoval, 1995a). It is obvious that farmers have grasped some opportunities such as the introduction of irrigation water for cultivating high yielding varieties in the dry season, micro-credit from NGOs for the poorer families, a part of

which may be used to buy fertilisers and insecticides to manage their high input demanding crops, better marketing facilities for some of their products, etc. By getting these opportunities, they are choosing crops suitable for the changing situations. On the other hand, in response to theses changes, farmers from different socio-economic groups take some adaptive strategies to deal with the constraints those have emerged. In doing this, sometimes they have to change their preferred choice and select suitable alternative ones. For example, Samjan, a rich farmer, preferred to cultivate more banana, a cost intensive crop, on his highland area and Kena, another rich farmer, preferred to lease out some of his land as *lease* due to labour shortage. This is because cultivating using hired labour was not profitable for them (Chapter 7, section 7.2.2.1).

On the other hand, Jamal, a small farmer, was interested in grow chilli, a labour intensive crop, as it gave him a steady income which he needed for day-today resource management (Chapter 7, section 7.2.2.1). The lack of availability of sufficient able labour is a constraint here. As rich farmers Samjan and Kena are reluctant to work in the field but Jamal, a poor man, had no such social problem and so will work in the field from dawn to dusk. It is likely, if we examine the adaptive strategies of Rahman and Nazrul after subsequent natural hazards, we would see their crop choices were different. Rahman was interested in covering his losses by growing more cash crops and helping his sharecropper to secure better crops but Nazrul was struggling to grow more grain crops for his subsistence (Chapter 7, section 7.4). The cropping decisions were different due to the socio-economic positions and the cognitive perception of the farmers.

In the decision-making process, the farmer's position in the society is important. This is because the construction of knowledge is based on one's personal, social, cultural, political and ecological context (Long and Long, 1992; Swidler and Arditi, 1994; Raedeke and Rikoon, 1997). The complexity of the individual's decision environment, coupled with the individual's values, objectives and resources has immense value because he can perceive constraints and opportunities in the real world from his socio-economic position. Practically every member of the society knows something, it does not follow that everybody knows everything (Holy and Stuchlik, 1981). On the basis of this perception, he can makes decisions. So there is no room for generalisations in the farmers' decision-making process. From the examples of Lutfor and Jeher (Chapter 6, section 6.2.1.1) or Tajimuddin and Aiub (Chapter 7, section 7.2.2.1) or Jamal and Kamal (Chapter 4, section 4.5.8), one can see in all the cases, the actors have similar economic positions, they may perceive some common ideas, but their cropping decisions were not similar.

This emphasises the importance of enquiring into the social distribution of knowledge according to the social status of the actors when seeking to discover how they gain knowledge and, subsequently, apply it in making decisions. However, as pointed out, if one gains knowledge, it does not mean that he or she will able to apply this knowledge in real world. It depends on the context of the situation.

Policy makers are less aware about these issues and their development models have failed, effectively, to represent this behavioural heterogeneity of floodplain farmers. Without any experience of long-term field work, it is easy for the development practitioners to conclude that farmers rarely deviate from the pattern of the community

i. e. the rules of their culture, but in reality as was highlighted in Chapter 7 and 8, they do. Thus it is important to identify and predict the likely behaviour of an individual or group of farmers in attempting to attaining their objectives. Therefore, the farming community should not be treated as 'typical farmer' rather as an 'individual farmer' (Rappaport, 1967; Netting, 1968; Johnson, 1981).

The resource flow pattern of farm families is complicated. They arrange their crop planning in such a way that they can manage their subsistence and also earn sufficient money to manage other crops in the subsequent seasons (see Figure 7.4 and 7.5). Therefore, cropping decisions follow a chain-like procedure. Farmers plan for their crops not only for a season or a year but further forward. Although they consider the possibility of occurrence of some irregularities, which may affect their routine plan, they make decisions considering these factors.

When any break occurs in this 'chain', it disrupts their systems and they have to rearrange their planning, although not always successfully. These are their attentive decisions (Gladwin and Murtaugh, 1980). They make these decisions through their experiences and, in these cases, they may not select their best suitable choice, however, they try to select a suitable alternative one. In doing this they do not think in bits and pieces about different factors such as soil moisture of the land or crop suitability, or water availability, the decisions come out from the image they have configured through their experience (Sillitoe, 2000b) and this image directs them to take action. As described, wealthier farmers cope better, but small or poor farmers face serious problems when they have to rearrange their schedules, as we have seen, farmers were growing *aus* paddy in *aman bhuin* or *aus* paddy instead of jute crop on their onion

cultivated land. Farmers knew which one was suitable for the respective plot, however, as they need paddy for their subsistence; they selected that crop which might prove harmful for them in a later stage. Other readjustments have been discussed in Chapter 6. At this time, farmers require flexible options from which they can make suitable decisions. However, nowadays this has reduced in the floodplain of Bangladesh. Once the floodplain was rich in bio-diversity and the farmers had more choice in making agricultural decisions, but as mentioned above, crop diversity has shrunk and they have to make their choices from a narrow range of crops, which makes their living standards more vulnerable. We can see this in case of Nazrul's strategies to cope with repeated hazards (Chapter 7, section 7.4).

The feed-back effect of these incidences may make future planning more complicated. If we consider the case of Jamal and Kamal (Chapter 4), Kamal failed to overcome his economic position due to 'situational constraints'. He failed to harvest his irrigated HYV paddy for the subsequent two years and, as a result, he was forced to mortgage and even sell his land and so his economic position went down and he had to become a day labourer. So the feed back effect of any break of the 'decision-chain' of a farm family may affect its further cropping decisions as well as adversely its economic strength.

Sometimes a change in the usual situation provides some opportunities for farm families. In our case above, Jamal's decisions fitted with the environmental conditions so he could consolidate his economic position. If we consider the case of Rokeya (Chapter 8, section 8.4.4), she availed herself of some opportunities offered by the micro-credit programmes. With these opportunities and with the help of her husband

they started income generating activities, bought one piece of land on which they could make their own choice of crops to grow. The market price of onion at both the national and international levels allow farmers to get a good price which ultimately influences farmers to choose to grow more onion crops on their suitable land. So 'situational opportunity' also influences farmers to change their cropping decisions. Decision-making models due to their universalism, fail to address these issues of decision-making criteria. Local events and the behaviour of local people toward these events are what influence their decision-making process.

Now the question may arise: do the floodplian farmers have enough freedom to make their cropping decisions independently? No, as was seen farmers cannot make all cropping decisions independently. They do construct knowledge independently from their previous experiences but sometimes cannot apply their 'best understanding' independently. They have to negotiate with others in making their decisions. In the floodplain, landscapes vary in elevation and consist of numerous plots of which the farmers are individual decision-makers. These resource users have to co-ordinate with the neighbouring farmers when making their decisions. There are, in fact, many diverse and potentially conflicting perceptions and interests, which shape the individual farmer's management strategies. Moreover to gain accesses to resources (land, capital, etc.) and services (marketing facilities, extension services, etc.), farmers are dependent on other stakeholders (see Chapter 8, section 8.5.4). These bio-physical and socio-economic interdependencies influence farmers' decision-making to a large extent. In the context of this social embedded ness perspective of farmers, Granovetter says:

> "Actors do not behave or decide as atoms outside a social context, nor do they adhere slavishly to a script written for them by the particular intersection of social categories they happen to occupy. Their attempts at purposive action are instead embedded in concrete, ongoing systems of social relations (1985: 487)."

It is these social relations that provide sets of options which farmers are obliged to follow in order to obtain their livelihoods. For example, for poorer farmers to gain access to land is important, whereas, wealthier farmers need a steady supply of labourers to manage their land. So they are interdependent. If one considers the relationships among *para* people (see Figure 8.5 in Chapter 8), or in a wider context, the stakeholder perspectives of local farmers (see Figure 8.6 in Chapter 8), it is obvious that a multi-stranded relationship exists there.

Each actor in these relationships independently tries to obtain as much as possible from another without demanding more than the other party will concede (e.g. landowner-tenant, water seller-cultivator, produce buyer-seller, etc.). These sets of relationships are conducted with references to the considerations of 'reciprocity' (Chapter 4, section 4.5 and 8, section 8.5.4). However, in a true sense, it is not a reciprocal relationship, because there remains no equitable balance in this 'give and take' between parties. In this system one party, normally the stronger actor, invests much of his effort to control the scope of the action of the weaker party. Barth (1981) and Jansen (1987) explain this as a '*dyadic* relationship'. When these sets of relationships shape into a whole perspective, it would become a symbiotic relationship. Since each party is capitalising on the other party in achieving his goal i.e. to obtain or maintain an adequate livelihood. This, in turn, effects the cropping decisions of farmers, because farmers remain the centre of this relationship.

It is vital that development practitioners need to understand this relationship before instituting any intervention, otherwise, it would not be sustainable or could even jeopardise the intervention programme as we have seen in the incidents of the LWI

research project. The natural scientists failed to understand that, in rural areas, people are not only bio-physically but also socially and economically interdependent. Under this relationships, it is not wise (unacceptable!) to display others opinion overtly (Chapter 2). This is because the opinion of the weaker may not be suitable for that of stronger and, consequently, conflict may arise. And this had happened in that project.

Fishermen do not want too much water to be abstracted in the dry season, as this might accelerate drying out fish habitats and reduce their catch for consumption and sale. Wealthier farmers prevented fishermen from fishing on their *kua* because they wished our DFID project to excavate the *beel.* These poor fishermen rely heavily on *beel* fishing to manage their subsistence. If the wealthy prevent them from earning their living, their lifestyle depreciates further. Sillitoe (2000c) emphasises the significance of addressing these competing and complementary demands between different user groups of people in the floodplain in different seasons.

What lessons can be learnt from the above discussions? Farmers' decision-making process is not just how a farmer makes his decisions in isolation. Many interrelated factors are involved. Therefore it is essential to understand the nature of the bio-physical environment, as well as the positions of the different actors involved in this system and their behavioural pattern. In other words, it needs a holistic approach to understanding the local reality and farmers' decision-making process.

Why farmers accept these development programmes? From the field experiences, it has been found that local officials and leaders often blindly support the government's development programmes. There is a tendency among these people to believe that the

introduction of such programmes will provide help and employment opportunities. Moreover, western technology is highly regarded and people have less confidence in their local technology or knowledge.

If we consider the development of Ujankhalsi region, it is obvious that in the name of development, government and other agencies introduced some interventions into the locality and, by the help of these, farmers were able to increase the rate of their production. However, they also caused some irreparable damage to the local environment and livelihood of some people particularly, fishers and poor farmers. The Brundtland Commission (1987) defined development as "...development which meets the needs of the present without compromising our ability to meet those of the future (WCED, 1987:11)". The UK's National Strategy for Sustainable Development defines development "as a better quality of life for everyone, now and for generations to come (Davis, 2000: 11)". So if we consider the above definitions of development, the increase of only 'crop production' without improving the quality of environment and life, is not the 'development' in a real sense.

In the development interface, natural scientists often use rural people as 'guinea pigs' to test their ideas and when they fail to achieve their goals, they say it was a 'learning process'. Gass and Biggs (1997), for example, say

> "Development goals are established; critical constraints and project or program problems are identified; a range of alternative methods for solving such problems and coping with such constraints are reviewed; and the 'best' method is finally selected. This method is then implemented, outcomes reviewed, conclusions drawn and lessons learned to feed back into the next development intervention. The cycle is then repeated (Gass and Biggs, 1987: 116)."

The main problem of these intervention works is that the scientists and rural people do not act using the same language, as both have different scripts (Scott, 1990; Nazera-Sandoval, 1998). Nevertheless, both are working towards nearly the same goals-greater productivity and sustainability of agriculture but using different criteria. In development programmes, the practitioners should have to incorporate both ideas. Otherwise, the rural people will remain 'guinea pigs' and implemented programmes will only be as 'learning phases'.

The fourth objective of this thesis is 'how indigenous knowledge can contribute to addressing the agricultural development'. The material presented and the discussions prove that local people have sufficient social and technical ability to live with this uncertain environment and their diverse activities can, in the long term, prove better adapted than the newly introduced schemes. This indigenous knowledge is flexible, dynamic and adaptable to the changing situation and has the capability to contribute in a large measure to addressing the agricultural development. The development practitioners need to incorporate this into their development programmes.

Transformation is taking place at the local and global level and interventions are being introduced with the supposed aim of 'improving rural resources management practices'. This is unavoidable and an ongoing process. Due to some unsuitable programmes, farmers and other resources users are facing problems when having to make appropriate decisions in order to obtain their livelihoods. Therefore, rural people should prepare themselves properly to accept those interventions, which will improve their economic conditions. The speed of change, their significance and different forms in which they are taking place are challenges for local people as well as for institutions

who are involved in providing support to the rural people. In this respect, Loevinsohn (2002) says,

> "The stakes are high: the capacity of rural people to adapt their decisions about resources- collectively, jointly or individually managed - to changed circumstances is key to their own well-being and to any meaningful sense of sustainable development (Loevinsohn, 2002:1)."

This thesis emphasises the need to explore 'what rural people know' and the constraints faced by them in making suitable agricultural decisions. Therefore, this thesis could form the base for further research - how we can use this knowledge to get rid of these constraints and developing suitable 'decision-support' systems by which sustainable agricultural development could be achieved.

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APPENDIX- I

CROPS AVAILABLE IN UJANKHALSI VILLAGE

Table 1: Field crops

Crops	Common name	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
Paddy	*Aus dhan*	*Shany* (L)	*Oryza sativa*	*Danga* and *Aus Bhuin*	Herb, annual	*Aus* season	Wide range of adaptation; drought resistance in juvenile stage and can tolerate up to 4 feet floodwater in mature stage. Do not need any irrigation.
"	"	*Gobra* (L)	"	Aus bhuin	"	"	Semi deepwater *aus* paddy and can grow within 4-5 feet water; suitable for broadcasting with deepwater *aman* paddy. Do not need any irrigation.
"	"	*Koijur* (L)	"	"	"	"	"
"	"	Chaina (HYV)	"	*Danga and aus bhuin*	"	*Aus* and *boro* season	Early variety, can tolerate up to 2 feet flood depth, could harvest before deep flood in *aus* season and before hailstorm in *boro* season. Need irrigation in *boro* season.
"	"	BR-26 (HYV)	"	*Danga, aus bhuin and aman bhuin*	"	"	In *aus* season, it can grow only on comparatively high land (*danga bhuin*) but during boro season, it can grow in all land, need irrigation in *boro* season, good yield. Need irrigation in *boro* season.
"	"	BRP (HYV)	"	"	"	"	Requires sufficient irrigation, huge fertilisers and insecticides. Panicles are not strong enough and affected by storm, good yield.
"	*Aman dhan*	*Digha* (L)	"	*Digha bhuin*	"	*Aman* season	Semi deep water *aman* paddy, can tolerate flood depth of 5-7 feet.
"	"	*Soli* (L)	"	*Soli bhuin*	"	"	Deep-water *aman* paddy, can tolerate flood depth of 8-10 feet and can increase its height with the

Crops	Common name	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
							increase of flood water.
"	"	*Mita korol*	"	*Aman bhuin*	"	"	"
"	"	*Boroam na*	"	"	"	"	"
"	"	*Kalozira*	"	*Danga* and *aus bhuin*	"	"	"
"	"	BR-11 (HYV)	"	*Danga bhuin*	"	"	Rain-fed paddy, can not tolerate flood water more than one and half feet, need irrigation if rain is late. Good yield.
	Boro dhan	*Bora Shaita* (L)	"	*Beeler thail*	"	*Boro* season	Can grow in land which remain under water and requires no ploughing, irrigation, insecticides and fertilisers. Can tolerate of 2 feet water.
"	"	IRRA TOM	"	"	"	"	Requires sufficient irrigation, huge fertilisers and insecticides. Panicles are strong enough and less affected by storm, good yield.
"	"	BR-10	"	"	"	"	"
"	"	***BR 14***	"	"	"	"	"
"	"	*BR 29*	"	"	"	"	"
Wheat	*Gom*	*Sonalika* (HYV)	*Triticum aestivum* L.	*Vita, danga* and *aus bhuin*	"	"	Early, requires one or two irrigation, good yield.
"	"	*Kanchan* (HYV)	"	"	"	"	Late, requires two or more irrigation, good yield
Mustard	*Sarisha*	*Deshi*	*Brassica campestris* L. var *toria*	"	"	*Chaitally*	Early, normally grows as a chance crop (between two crops *aus*-mastard-onion) no irrigation and fertiliser required.
Rape seed	*Rai*	*japani*	*B. juncea* L.	*Danga* and *aus bhuin*	"	"	Late, requires one or two irrigation, good yield.
Sesame	*Til*	*kalo (L)*	*Sesamum indicum* L.	"	"	*Boro* season	Chance crop (normally cultivate between two important crops, like potato-sesame-*aus* paddy), no irrigation or fertiliser required.
"	"	*Lal*		"	"	"	"
Soya bean			*Glycine max* (L) Mern				
Sunflower			*Helianthus annus* L.				
Lentil	*Musur*	*Deshi* (local)	*Lens esculenta* L.	"	"	*Chaitally*	Early, normally use as chance crop (between two crops *aus*-lentil-

Crops	Common name	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
							onion) no irrigation, fertiliser required. Also used as mixed cropping - lentil with mustard.
Gram	*Chola*	"	*Cicer arieticum* L.	"	"	"	
Mung bean	*Moog*	"	*Phaseolus radiantus*	"	"	"	
Black gram	*Mash kali*	"	*P. mungo* L.	"	"	"	
Horse gram	*Karti kalai*	"	*Dolichos biflorus* L.	*Bhita bhuin*	"	"	
Pigeon pea	*Arohor*	HYV	*Cajanus cajan* (L) Huth.	*Bhita* and *danga bhuin*	shrub	perennial	
Long bean	*Borboti*	*Deshi*	*Vigna catiang* Walp.	"	Liana	*Aus* and *chaitally* season	
Jute	*Pat*	*Veli*	*Corchorus olitorius* L.	*Danga* and *aus bhuin*	shrub	*Aus* season	Can grow at 3-4 feet flood depth, increase soil fertility, leaving suitable for onion or HYV *boro* paddy cultivation
Jute		*Guti* (local ?)	*C. capsularis* L.	"	"	"	Can grow at 4-5 feet flood depth, increase soil fertility, leaving suitable for onion or HYV *boro* paddy cultivation
Banana	*Kola*	*Safri* (HYV)	*Musa sapientum* L.	*Vita bhuin*	Tree	Annual	Planted in *aus* season and fruiting starts from late winter, used only after ripe
"	"	*Manik*	"	"	"	"	"
"	"	*Bichi*	"	"	"	"	Planted in *aus* season and fruiting starts from late winter and after one year fruits are available throughout the year, used flower, stem and green one are for cooking curry and ripe one for eating.
"	"	*Anaji*	*M. paradisica*	"	"	"	Planted in *aus* season and fruiting starts from late winter and after one year fruits are available throughout the year,

Crops	Common name	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
							green one is eaten as a cooked vegetable.
Papaya	*Pepe*		*Carica pepe*	"	"	"	Planted in *aus* season and fruiting starts from early autumn
Winter onion	*Laila piaj*	*Kalash nagar* (local)	*Allium cepa* L.	*Bhita, bhuin*	herb, annual	*Chaitally*	Bulbs used for planting, requires little or no irrigation, not possible to store for longer period.
Summer onion	*Secha piaj*	"	"	*Danga* and *aus bhuin*	"	*Boro* season	Seeds used for growing seedlings and then transplanted seedlings, require frequent irrigation, could store in-house condition for a long period (8 months or more).
Onion seeds	*Kodom*	"	"	*Danga* and *vita bhuin*	"	"	Selected used for planting, requires irrigation, when flowers matures collected for seeds and bulb are used as spices, not possible to store for a longer period.
Potato	*Alu*	*Deshi* (local)	*Solanum tuberosum* L.	*Vita, danga* and *aus bhuin*	"	*Chaitally*	Requires less fertilisers, irrigation, can be stored for a long time in house conditions
"	"	*Hollander* (HYV)	"	"	"	"	Requires much irrigation, good yield, not possible to store for a long time except Cold storage.
Radish	*Mula*	*Lal* (local)	*Raphanus sativus* L.	"	"	"	Winter vegetable
"	"	*Sada* (HYV)	*Firmiana colorata* R. Br.	"	"	"	"
Carrot	*Gajar*		*Daucus carota*	"	"	"	"
Gerlic	*Rashun*	*Deshi* (lical)	*Allium sativum* L.	"	"	"	"
Taro	*Kachu*	*Mukhi*	*Colocasia esculenta*	*Vita bhuin*	"	*aus season*	Rhizomes used for transplanting the crop in dry season, after first rain, seedlings come out.

Crops	Common name	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
"		*Pani*	*C. nymphaefolia*	*Doba , Pukur*	"	"	"
Termaric	*Holud*		*Curcuma domestica*	*Vita bhuin*	"	*aus* and *aman* season	"
Chilli	*Morich*		*Capsicum frutescens* L.	"	"	*Aus* and *boro* season	Seeds used for preparing seedlings and seedlings are transplanted.
Brinjal	*Begun*		*Solanum melongena* Wall.	"	"	"	"
Tomato	*Tomato*		*Lycopersicon esculentum* Mill.	"	"	*Boro* season	"
Okra	*Dherosh*		*Hibiscus esculentus* L.	"	"	"	"
Coriander	*Dhone*		*Coriandrum sativum*	Vita, danga and aus bhuin	"	"	"
Cabage	*Banda kopi*		*Brassica oleracea* L. var *capittata*	"	"	"	"
Cauliflower	*Phul kopi*		*B. oleracea* L. var. *botrydis*	"	"	"	"
Cucumber	*Khirai*		*Cucumi sativus* L.	*Danga* and *aus bhuin*	Liana	*Boro* season	Seeds used for transplanting
Palwal	*Potol*		*Trichosanthes dioica* Roxb.	*Vita* and *danga bhuin*	"	"	Rhizome used for transplanting the crop.
Bitter gourd	*Ussaya*		*Momordica chrantia* L.	*Vita, danga* and *aus bhuin*	"	"	Seeds used for transplanting the crop.
Pumpkin	*Bilati*		*Cucurbita pepo*	*Vita* and *danga bhuin*	"	"	"
Spinach	*Palangshak*		*Spiacea oleracea* L.	"	"	"	"
Idian spinach	*Data shak*		*Amaranthus gangetica*	"	"	"	"
Local spinach	*Puishak*		*Basella rubra*	"	"	"	"
Betel	*Paan*		*Piper betle*	Vita	Liana	Perennial	Rhizome used for transplanting the crop.

Table 2.1 Homestead crops:

Crops	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
Bottle gourd	*Lau*	*Lagenaria vulgaris*	*Vita bhuin*	Liana	*Aman-boro* season	
Pumpkin	*Machan bilati / Sada kodu*	*Cucurbita pepo*	"	"	*Aus-aman* season	
Ash pumpkin	*Chal kumra*	*Benincasa cerifera*	"	"	*Aus* season	
Yam	*Gor alu*	*Dioscorea alata*	"	"	Annual	
Velvet bean	*Shim*	*Mucuna nivea*	"	"	*Aman-boro* season	
Sponge gourd	*Dhundul*	*Luffa aegyptica*	"	"	*aus -aman* season	
Cucumber	*Sosha*	*Cucumis sativus*	"	"	"	
Bitter gourd	*Korola*	*Momordica charantia*	"	"	"	
Chilli	*Dhani morich*	*Capsicum minimum*	"	herb	Biannual/ perennial	
"	*Batasha morich*	*Capsicum sp.*	"	"	"	
"	*Kamranga/ Bombai morich*	*Capsicum sp*	"	"	"	
Brinjal	*Sola begoon*	*Solanum melongana* var. *esculenta*	"	"	*Aman-boro* season	
"	*Tit bagoon*	*S.melongana* var. *Anda*	"	"	Biannual	
Amaranth	*Kata khura*	*Amaranthus spinosus*	"	"	Annual	
Spinach	*Machan pui*	*Basella rubra*	"	"	*Aus-aman* seasom	
Zinger	*Ada*	*Zingiber officinale*				
Pineapple	*Anarash*	*Ananas sativus*				
Taro	*Moulvi / Dudh kochu*	*Colocasia anitiquorum* Scott.	"	Herb	Perennial	
"	*Kali kochu*	*Colocasia sp.*	"	"	"	
Arum	*Man kochu*	*Colocasia indica*	"	"	"	
	Kolmi shak	*Ipomea reptens*	Ditch/pond	Liana		
	Sushni shak	*Marsilea quadrifoliata*	"	Herb		
	Note shak	*Amaranthus blitum*	*Vita bhuin*	"		

Table 2.2 Fruit-tree crops (homestead crops):

Crops	Local name	Botanical name	Type of Land grown	Habit	Growing season	Adaptability
Mango	*Aam*	*Mangifera indica*	Vita bhuin	Tree	Perennial	
Litchi	*Lichu*	*Litchi chinensis*	"	"	"	
Coconut	*Narikel*	*Cocos nicifera*	"	"	"	
Jackfruit	*Kanthal*	*Artocarpus heterophyllus*	"	"	"	
Guava	*Peara*	*Psidium guayava*	"	"	"	
Sajina	*Sajna*	*Moringa oleifera*	"	"	"	
Date palm	*Khejur*	*Phoenix sylvestris*	"	"	"	
Tal palm	*Tal*	*Borassus flabellifer*	"	"	"	
Grapefruite	*Batabi labu*	*Citras grandis*	"	"	"	
Jujuba	*boroi*	*Zizyphus jujuba*	"	"	"	
Lemon	*Labu*	*Citras aurantifolia*	"	"	"	
Bay leaf	*Tejpata*	*Cinnamomum tamala*	"	"	"	
Black berry	*Jam*	*Syzigium jambolana*	"	"	"	
Tamarind	*Tatul*	*Tamarindus indicus*	"	"	"	
Wood apple	*Bel*	*Aegle marmelos*	"	"	"	
Rose apple	*Jamrul*	*Syzigium javanica*	"	"	"	
Papaya	*Pepe*	*Carica pepe*	"	"	"	
Banana	*Manik Kola*	*Musa sapientum*	"	"	"	
"	*Bichi kola*	"	"	"	"	
"	*Anaji kola*	*Musa paradisica*	"	"	"	
Cuatard Apple	*Sorifa*	*Annona squamosa* L.				

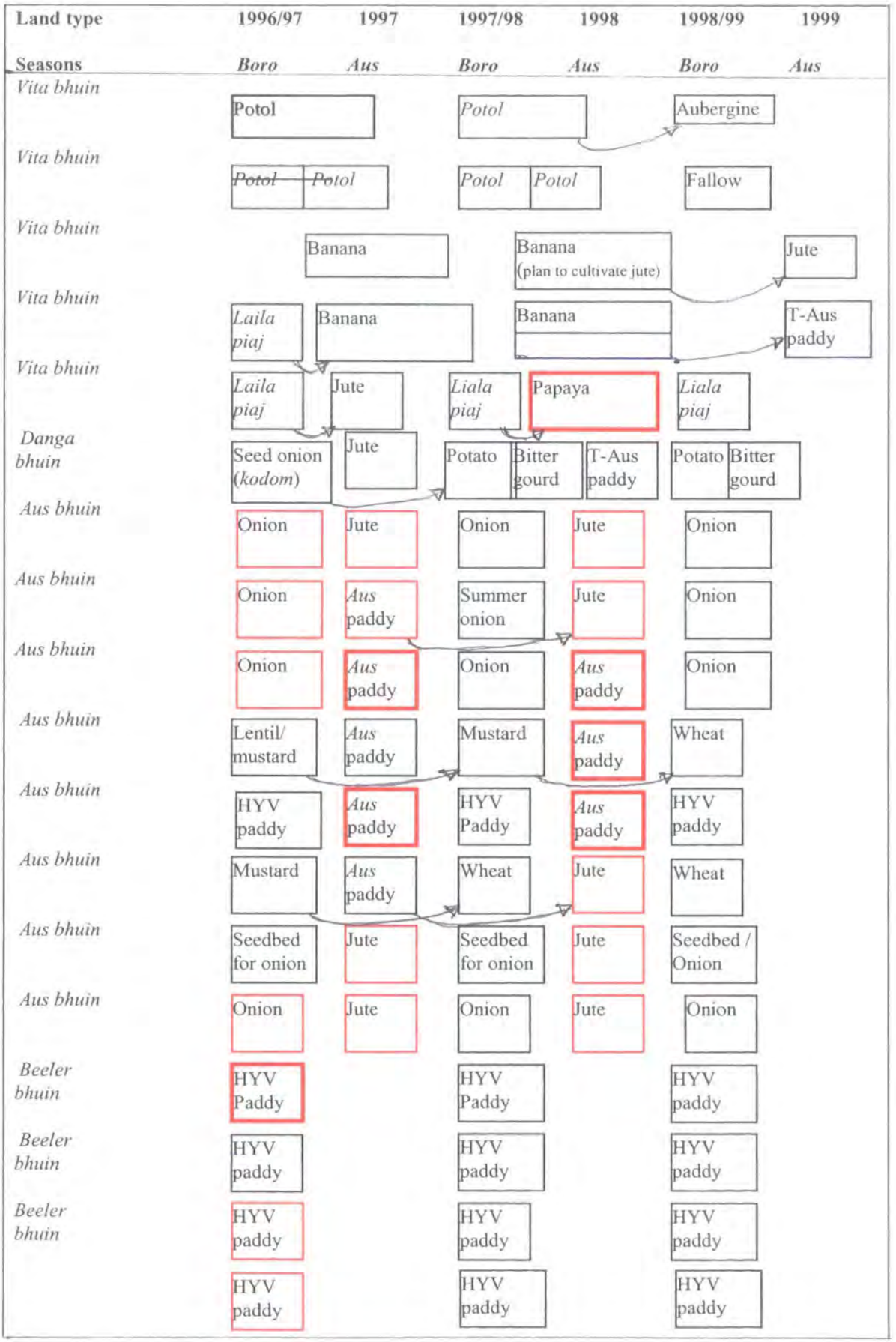
APPENDIX - II

CROP PLANS OF TWO FARMERS OF UJANKHALSI VILLAGE

1. Crop plan of Nazrul (1996-97 to 1999)

Land type	1996/97	1997	1997/98	1998	1998/99	1999
Seasons	*Boro*	*Aus*	*Boro*	*Aus*	*Boro*	*Aus*
Aus bhuin	Onion	Jute	Mustard	Onion	Jute	Mustard / Onion
Aus bhuin	HYV paddy	*Aus* paddy	Wheat	*Aus* paddy	Lentil	Onion
Digha bhuin	HYV paddy	*Aus* paddy	Mustard	HYV paddy	*Aus* paddy	Mustard / HYV paddy
Digha bhuin	HYV paddy	*Aus* paddy	Mustard	HYV paddy	*Aus* paddy	Mustard / HYV paddy
Digha bhuin	HYV paddy	*Aus* paddy	Mustard	HYV paddy	*Aus* paddy	Mustard / HYV paddy
Beeler bhuin	HYV paddy	Not suitable for cultivation	HYV paddy	Not suitable for cultivation	HYV paddy	
Beeler bhuin	HYV paddy	Not suitable for cultivation	HYV paddy	Not suitable for cultivation	HYV paddy	
Aus bhuin	Got this plot in 1998.	Not in hand	Not in hand	Jute	Onion	
Aus bhuin	Got this plot in 1999.	Not in hand	Not in hand	Not in hand		

2. Crop plans of Rahman (1996-97 to 1999)



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Seasons	*Boro*	*Aus*	*Boro*	*Aus*	*Boro*	*Aus*
Aus bhuin	Onion	Jute	Mustard	Onion	Jute	Mustard / Onion
Aus bhuin	HYV paddy	*Aus* paddy	Wheat	*Aus* paddy	Lentil	Onion
Digha bhuin	HYV paddy	*Aus* paddy	Mustard	HYV paddy	*Aus* paddy	Mustard / HYV paddy
Digha bhuin	HYV paddy	*Aus* paddy	Mustard	HYV paddy	*Aus* paddy	Mustard / HYV paddy
Digha bhuin	HYV paddy	*Aus* paddy	Mustard	HYV paddy	*Aus* paddy	Mustard / HYV paddy
Beeler bhuin	HYV paddy	Not suitable for cultivation	HYV paddy	Not suitable for cultivation	HYV paddy	
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Aus bhuin	Got this plot in 1998.	Not in hand	Not in hand	Jute	Onion	
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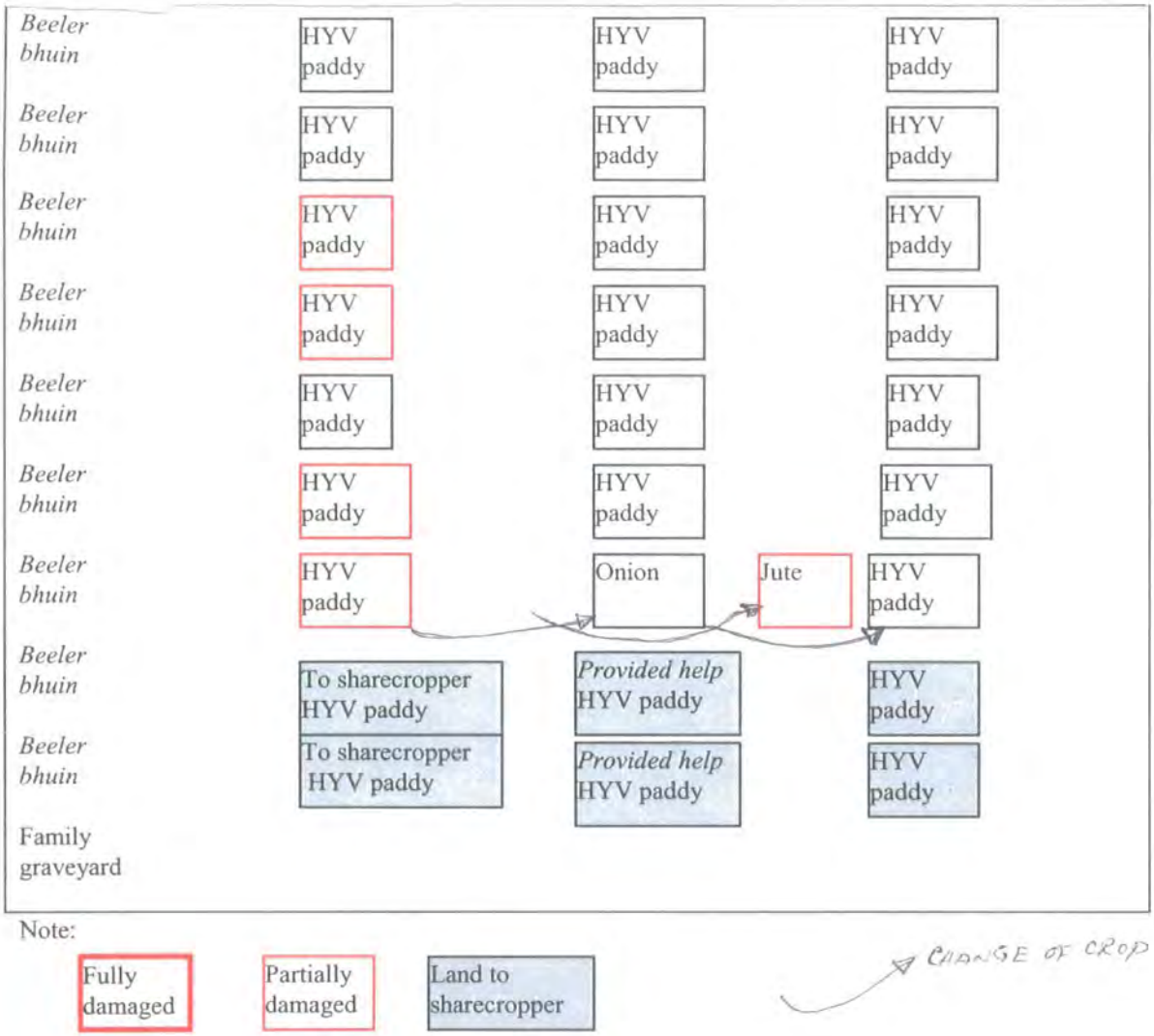
Beeler bhuin
HYV paddy
Beeler bhuin
HYV paddy
Beeler bhuin
HYV paddy
Beeler bhuin
HYV paddy
Beeler bhuin
HYV paddy
Beeler bhuin
HYV paddy
Beeler bhuin
HYV paddy
Onion
Jute
HYV paddy
Beeler bhuin
To sharecropper HYV paddy
Provided help HYV paddy
HYV paddy
Beeler bhuin
To sharecropper HYV paddy
Provided help HYV paddy
HYV paddy
Family graveyard
Note:
Fully damaged
Partially damaged
Land to sharecropper
CHANGE OF CROP

APPENDIX III

GLOSSARY OF ABBREVIATIONS, ACRONYMS AND LOCAL BENGALI TERMS

Local Bengali term	**English meaning**
Aam	Mango
Ail	Muddy band which separates one plot from another
Alga	loosen
Alu	Potato
Amabasya	Day with no moon
Aman bhuin	One indigenous land category
Ardhek	Half
ASA	Association Social Advancement -- a non-governmental organisation, engaged in rural development
Atha	Sticky
Aus bhuin	One type of indigenous category of land (*bhuin* = land)
Aus dhan	Paddy grows in *kharif* one season (early monsoon season)
B-aus	Broadcaste *aus* Paddy
Baba / Abba	Father
Babosai	Traders / Merchant
Badami	Brown
Bagi	Sharecropping
Bagoon	Aubergine
Baishak	Mid-April to mid-May
Jaishtya	Mid-May to mid-June
Ashar	Mid-June to mid-July
Sraban	Mid-July to mid-August
Bhadra	Mid-August to mid-September
Ashwin	Mid-September to mid-October
Kartik	Mid-October to mid-November
Agrayan	Mid-November to mid-December
Poush	Mid-December to mid-January
Magh	Mid-January to mid-February
Phalgun	Mid-February to mid-March
Chaitra	Mid-March to mid-April

Local Bengali term	English meaning
Band	Embankment
Bonnya	Flood
Baparies	they are itinerant traders, who buy produce from the local growers and sell it to the whole-sellers directly or through commission agents
BARC	Bangladesh Agricultural Research Council
Bari	Home refers for extended family
BARI	Bangladesh Agricultural Research Institute
Batraj	Water hyacinth
Bazar	Local market holds everyday in the week
BBS	Bangladesh Bureau of Statistics
Beel	Floodplain depression: containing perennial or semi perennial water bodies
Beel kandari	One indigenous land category
Beel-er bhuin	One indigenous land category
Beel-er thail	One indigenous land category (Lowest point of the *beel*)
Beeztola	Seedbed (*beez*= seed , *tola* = bed / area)
Bele / Baula	Sandy
Beporda	Women without veil
Beshi	More
Bhai	Brother
Bhalo falan	Good yield (*bhalo* = good, *falan*= yield)
Bhat	Boiled rice
Bhuin bhajano	Sun dry of soil
Bichar / salish	Justice
BIDS	Bangladesh Institute of Development Studies
Bigha	Local land measurement (I bihga = .33 acre)
Bikano fasal	Cash crop
Bindu	A chili cultivar
BKB	Bangladesh *Krishi* Bank (Bangladesh Agriculture Bank)
Bon	Sister
Bondor	It means port. It is actually a trading town, situated near any port.
Bongsho	Lineage
Bora amna	Local deep water *aman* cultivar
Borgader	Sharecropper
BR-11	A HYV paddy cultivar

Local Bengali term	English meaning
BRAC	Bangladesh Rural Advancement Committee -- a non-governmental organisation, engaged in rural development
BRDB	Bangladesh Rural Development Board
BRP	A HYV paddy cultivar
BRP	Type of a HYV paddy cultivar
BRRI	Bangladesh Rice Research Institute
CARITAS	A non-governmental organisation, engaged in rural development
Cassal	One indigenous land category
Chacha	Uncle
Chachi	Aunt (paternal uncle's wife)
Chai	Ash
Chaitally	Dry cropping season crop (early)
Char	Sand bar
Chash	Ploughing
Chasha	Cultivator
China / Chaina	HYV paddy cultivar
Chitano	Broadcasting of seeds
Chitka / etel / metel	Clayey
Chitka-goda	Clayey granular
Chora	Banana bunch
Chora	Specific area in the *beel*
Chutkel	Member of the *samaj*
Cowdhury	Surname, normally used by landlords which designated those landlords who occupy land all sides of his house
CREED	Collaborative Research in the Economics of Environment and Development -- a joint initiative of IIED of London and IVM (Institute of Environmental Studies), Amsterdam.
Dadon	It is a kind of loan, advanced by grain traders to the farmers with a condition that the borrowers will sell his produce to the traders with current market price
Danga bhuin	One indigenous land category
Deshi	Local
DFID	Department of International Development
Dhan	Paddy
Dhani lok	Rich people
Dharma baap	Spiritual father

Local Bengali term	English meaning
GOB	Government of Bangladesh
Gobra	Local deep water *aman* paddy
Goda	Granular (one indigenous textural class)
Gom	Wheat
Goromkal	Hot season
Gram	Village
Grisma	Summer season
Gushthi	Kins group
Guti pat	One cultivar of Jute
Hat	Weekly market (normally two days a week)
Hat	Hand (an indigenous length measurement unit; from albo to tip of the finger = 18 inches)
Hat	Local market holds twice or once a week, has permanent or semi-permanent structure.
Hemonto	Late autumn
HYV	High Yielding Varieties
IIED	International Institute of Environment and Development, London
IK	Indigenous knowledge
IRRA-TOM	Type of a HYV paddy cultivar
Irri	HYV paddy
IUCN	International Union for the Conservation of Nature
Jakat	kind of alms giving enforced by the Islamic religion on those who are consider rich
Jamai	Son-in-law
Jamat	Congregation
Japani or japani sarisha	Rye (HYV rape seed)
Jat	Cultivar
Jawi mati	One kind of textural classed soil (loamy soil)
Jhur jhura	loose
Joma	Deposition
Jomi	Plot / land
Ju	Moisture content
Kachi	Scikle
Kal	Season
Kalashnagar	One cultivar of onion
Kalche	Blackish

Local Bengali term	English meaning
Dharma bhai	Spiritual brother
Dharma bon	Spiritual sister
Dharma ma	Spiritual mather
Digha	A local *aman* paddy cultivar
Digha bhuin	One indigenous land category
Do-fasli	Double cropped
Doba	Ditch
DOF	Department of Fisheries, Government of Bangladesh.
Dokander	A shopkeeper, who retails good to the local people.
Dokshin	South
Done	Long scoop like things, used in surface water irrigation
Dosto/ mita	Friendship
DTW	Deep Tube Well
Edd-ul-Fitre	Muslim religious festival in the month of Ramadan
Eidd-ul-Azha	Muslim religious festival in the month of Jilhaj
Ek-chohur	Near 12-18 feet (indigenous measurement of beel water)
Ek-fasli	Single-cropped
Faita	Funeral ceremony
FAP	Flood Action Plan (flood mitigation and water management plan)
Faram	HYV *boro* cultivation
Farias	They are the agents of wholes-ellers or commission agents who exploit growers to sell their produces to the respective their whole-sellers or commission agents
Fasal	Crop
FCD	Flood Control and Drainage -type of flood control scheme
FCD/I	Flood Control, Drainage and / or Irrigation - type of flood control scheme with irrigation facilities
FFWP	Food For Work Programme
Fitra	Kind of alms giving enforced by the Islamic religion during Eid-ul-Fitr festival
FSR	Farming System Research
Gabar	One indigenous land category
GDP	Gross Domestic Product
Ghor	Home, refers for nuclear family
Ghor jamai	Daughter's husband, who comes to live with in-laws house
Ghush	Bribe
Giddaly	Village crop watchman

Local Bengali term	English meaning
Kalo	Black
Kandi	Bunch of banana
Kandor	One indigenous land category
Kanthal	Jackfruit
Katha	Local land measurement (1 katha = .015 acre, 20 katha = 1bigha)
Kati kalai	Black mung bean
Khaikhalasi	Kind of mortgaging in which the land leased out reverts to the landlord after an agreed period
Khal	Canal
Kharif	Rainy cropping season (rain-fed crop)
Khas	The land that vested with government
Khora / kora	Hardy (the soil which becomes hardy when dried)
Khuchra babosai	Petty traders
Kodal	Spade
Kola	Banana
Kom jawi	Less loamy (kom = less)
Kot	Mortgaging
Kotbondoki	Kind of mortgaging of land in which land remains under the control of the money lender until the loan is paid
Laila piaj	Winter onion
Lalche	Redish
Langol	Plough
Lau	Bottle gourd
Laycha / beel-er laycha	One indigenous land category
Lok	Man
Loko guru	Teacher of the world
LWI	Land Water Interface
Man / man kachu	Arum
Mas	Fish
Mati	Soil
Mela	Folk fair
Mistikumra / Bileti	Pumkin
Mita korol	Local deep water *aman*
Mohazon	Whole-seller / commission agent
Moi	Ladder
Mondol	A social status

Local Bengali term	English meaning
Morich	Chili
Motamuti	Medium / moderate
Mound	Bengali weight measurement unit (1 mound means 37.5 kg)
Mouza	The smallest revenue unit of Bangladesh similar to village
Mula	Radish
Nadi	River
Nagla	Harrow
Nanda	Cow dung stick
NEMAP	National Environmental Management Action Plan (for Bangladesh)
NES	National Environmental Secretariat, Kenya
NGO	Non-governmental Organisation
Nichu / Niche	Low
Nichu jomi	Low land
Niom	Norms
Nongla	Lately
NRM	Natural Resources Management
NRSP	Natural Resources System Programme (of DFID)
ODA	Former acronym of DFID of UK government standing for Overseas Development Administration
Pagar	Ditch
Pali	Silt
Pan	Bettle leaf
Panta	Fermented rice
Panta pani	Fermenred rice water
Paosh	Compost
Para	Neighbourhood
Paribar	Family
Parijat	One HYV paddy cultivar
Parishad	Council
Pashchim	West
Pat	Jute
Pat ash	Jute fibre
Pata kopi	Cabbage
Peara	Guava
Pepe	Papaya
PET	Potential Evapo-transpiration

Local Bengali term	English meaning
Phul kopi	Cauliflower
Piaj	Onion
PLA	Participatory Learning and Action
Pore jaoa	Lodging
Potol	Pointed gourd
PRA	Participatory Rural Appraisal
Pradhan	Headman of the *samaj*
Pramanik	Sub-headman of the *samaj*
Pre-kharif	Early rainy cropping season
Purba	East
Rabi	Cropping season (dry season)
Rashun	Garlic
RKB	Rajshahi *Krishi* Bank (Rajshahi Agriculture Bank)
RSS	Reconnaissance Social Survey
Sech	Irrigation
Sajina	One kind of vegetable (*Moringa* sp)
Sakinder	Village massenger, a social status
Samaj	A corporate social organisation (local or neighbourhood groupings) which acts as protectors of norms and values within the village
Samajic niom / ain	Social norm
Samajic samprity	Social harmony
Sar	Fertiliser
Sarat	Autumn
Sarder	A social status
Saree	Long cloth (about 5 yards), used by Bengali women
Sarisha	Mustard / rape seed
Seba mulaya	Service charge
Secha piaj	Summer onion
SEM	Socio-economic Methodology
Shany	A cultivar of *aus* paddy
Shariq	Joint owner of assets
Sheet	Winter
Shokti	Fertility (Power)
Shukno	Dry condition
Siki	One-fourth
Singoit	Jute stick

Local Bengali term	English meaning
Sobha	Meeting
Soli	Local deep water *aman*
Soli bhuin	One indigenous land category
STW	Shallow Tube Well
Sud	Interest on money
T-aus	Transplanted *aus* paddy
Taka	Bangladesh currency (one pound sterling equivalent 80.00 *Taka* - in the year 2001)
Tal	Palm
Teoulka	A viral disease
Thana	Police station
Thana	Larger administrative unit, equivalent to a sub district or county. There are 490 *Thana* in Bangladesh
Til	Sesame
Tin- fasli	Tripple cropped
TOT	Transfer of Technology
Uchu	High
Uttar	North
Van	Three wheeler, non-motorised cycle
Veli pat	One cultivar of Jute
Vita	One indigenous land category (= flood free high land)
Voshka	Spongy (one indigenous soil type)
Voshka goda	Spongy and granular (one indigenous soil type)
Zamindar	Landlords, who collected taxes for the Mughal and British East India Company